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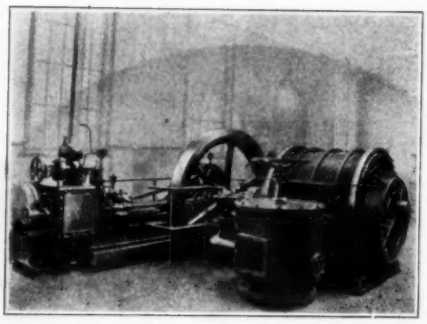

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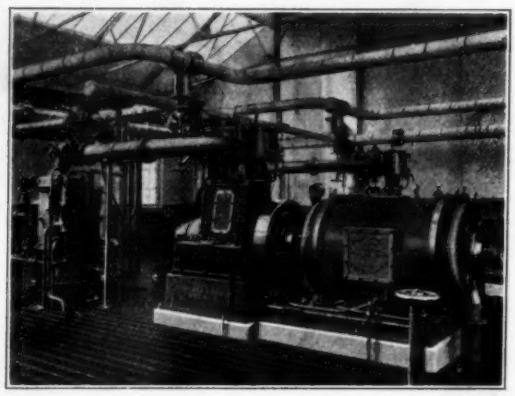

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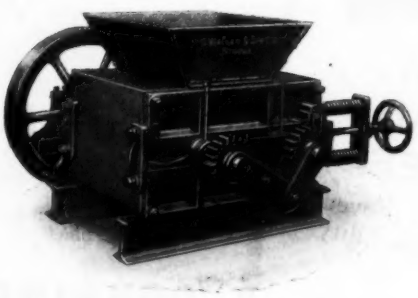

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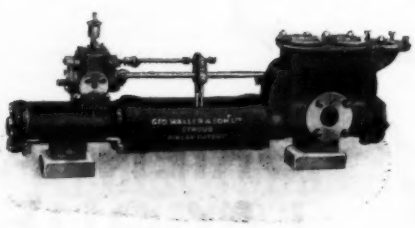

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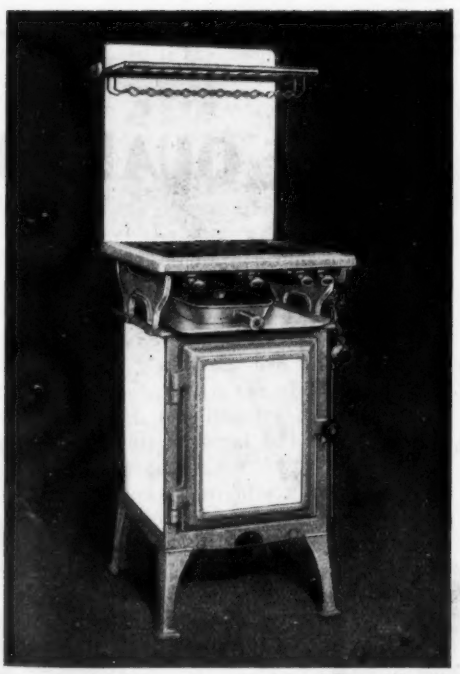

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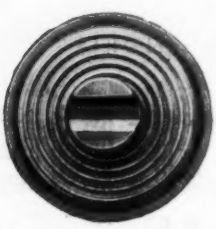

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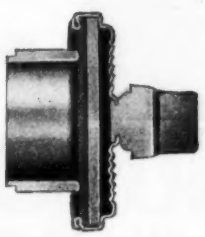

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Gas Journal

FEBRUARY 13, 1935

Vol. 209. 87th Year No. 3743.

Editorial Notes

The Market for Pitch

CERTAIN figures on our Markets Page are exceedingly interesting. On the London Market creosote is quoted at 5d. to 5½d. a gallon, while in Scotland, where "creosote oil remains scarce," 4⅞d. to 5d. is quoted. A year ago creosote was quoted in London at 3d. to 3¼d. a gallon, and in Glasgow at 3½d. to 3¾d. per gallon.

Now this hardening in the market for creosote is, up to a point, most gratifying; it is also, as we have been at pains to point out recently in these columns, highly significant. We have advanced reasons for the firm tone of the creosote market, and without question one very important reason is the progress of hydrogenation. We are exporting British creosote to foreign countries for its conversion into motor spirit, and we are selling to buyers in this country for the self-same purpose. The whole situation needs watching very carefully indeed. In the "JOURNAL" for Jan. 16, we advocated that the policy the Gas Industry should pursue ought to be short-term contracts—that the Industry should look ahead, not sell ahead. The creosote problem presents more than meets the eye. Its complexities are many, and their solution not easy. While, however, this solution is being sought, gas undertakings should keep a firm hand on the creosote they manufacture. We have good grounds for believing that, with a tax of 8d. a gallon on imported motor spirit, 5d. a gallon for creosote is not too good a price when this material is being sold as a raw product for hydrogenation.

The Pitch Market provides a very different story. A year ago it was fetching 65s. a ton. To-day it can only command 45s. a ton. Stocks of pitch are larger than for some time, and the situation demands careful consideration. It is no use sitting down bewailing gloomy facts. Instead, we should be searching for new outlets, or, perhaps, making less pitch. The overproduction of pitch is due largely to the demand for creosote; and we suggest that consideration might be given to means for taking some of the pitch off the market. In this connection we are exceedingly interested in the results of some preliminary investigations undertaken at the Fuel Research Station. On ordinary straight distillation, high-temperature horizontal retort tar leaves a residue of about 60% of pitch. The same horizontal retort tar, however, if distilled under pressure in the presence of hydrogen, *and without a catalyst*, leaves only 40% of pitch. This is a remarkable reduction which may well have an important commercial bearing. The resulting pitch has properties different from the material from ordinary straight distillation, and these properties will, of course, have to be investigated. We call attention to this preliminary piece of work as indication of the possibilities of transforming a falling market into a rising one by modifying practice to meet changing conditions. The Gas Industry has the tremendous advantage of producing, in addition to gas, a number of valuable products, and this fact gives it great flexibility in altering its processes to suit the times. But the times nowadays are different from twenty years ago, when delay in adjustment did not matter to the same extent, when other interests were not waiting round the corner to take advantage of the Industry's lack of keenness and initiative.

Again, is the Gas Industry watching movements in the anthracite industry? In the latter industry at the moment there is much talk—and in fact it amounts to more than mere talk—of utilizing anthracite dust in the form of marketable briquettes. There is, in other words, a move towards the up-grading of anthracite and more accurate screening. The briquetting process will mean a demand for pitch, and we suggest that this demand will not imply a reversion to a smoky fuel. The plan will probably be to employ the pitch as a binder, and then to carbonize after briquetting. This provides another example, if perhaps a minor one, of the need for the Industry to look ahead.

Assessing Gas-Making Results

WIDESPREAD interest was aroused by our editorial comments in the "JOURNAL" for Dec. 5 last on "Pexton's Yardstick." This yardstick is a simple means of evaluating the make of therms of enriching hydrocarbons in any type of carbonizing or gas-making plant, and we suggested that this factor will have a great bearing on the future prosperity of the Gas Industry. Dr. S. Pexton, of the Gas Light and Coke Company, explained his idea at a meeting of the North-Western Section of the Institute of Fuel on Nov. 21. Since that date he has translated his thoughts into a formal paper, and by courtesy of the Institute we are able to publish it in full in to-day's "JOURNAL." It is a contribution which

demands close and careful study; and, in view of the light which it sheds on the gas-making process, we are sure that it will be accorded such study.

In the " JOURNAL " for Dec. 5, 1934, we went so far as to say that the yield of enriching hydrocarbons constitutes the keystone of the gas-making process, a true index to efficiency. We suggested that make of therms per ton of coal so often quoted as indicative of the excellent working of plant may in fact mean very little, and that throughput of coal through a setting is not in itself necessarily a criterion of gas-making efficiency.

The crux of Dr. Pexton's paper is a simple formula for the evaluation of " E," the Hydrocarbon Enrichment Value, defined as the product of the inert-free volume of a gas and its excess calorific value over 318. In the absence of coal gas leakage out of the retorts the value of " E " is an index of the cracking conditions within the retort. An increase in the value of " E " means an approach towards optimum cracking conditions. As this value decreases it indicates one of two things—either under-cracking due to insufficient heat, or over-cracking due to excess of heat or leakage of gas from the retort. With under-cracking we get a gas of high calorific value but of small volume and of high specific gravity, and the yield of tar, with the characteristics of low-temperature tar, is high. With over-cracking, on the other hand, we have a low tar yield, a high volume of low calorific value gas of low specific gravity, and all the troubles of naphthalene, and so on, which are part and parcel of over-cracking. Moreover, over-cracking results in the deposition on the surface of the coke of highly unreactive carbon which renders the coke more difficult to ignite. A further point of the utmost importance is that the best value of " E " means that water gas dilution of the gas produced can be carried out to the greatest advantage and it allows the best use to be made of benzole recovery.

Economic Significance

THE point which will be asked is whether the hydrocarbon enrichment value has economic significance. As the author points out, the object of the carbonizing process is to produce gas of the desired quality at the lowest cost, consistent with the supply of the other products—coke, tar, and benzole—in the relative quantities and with the properties best suited to meet the present and prospective demands. And he emphasizes that because one plant has a higher hydrocarbon enrichment value than another using the same coal, it does not necessarily mean that it produces a cheaper gas. Among the important factors are the cost of coal *minus* the credits from bye-products, expressed per therm of gas, and the thermal output of gas per day, which affects the appropriate charges in respect of capital and operation. Hydrocarbon enrichment values do, however, have a bearing upon the yields of the respective products, and, to some extent, upon their qualities. An exceedingly interesting example is given of two tests on the same coal, one of which gave a hydrocarbon enrichment value of 37·3 and the other a value of 36·1. In the latter case there was over-cracking, the yields being 81·7 therms of gas and 5·6 gallons of tar per ton of coal carbonized. With the higher hydrocarbon enrichment value the corresponding yields were 81·2 therms of gas and 9·2 gallons of tar. Assuming that at the retort house the gas and tar are worth 2·0d. and 1·25d. per therm respectively, then the higher hydrocarbon enrichment value shows a saving of 3·5d. per ton. Nor is this the only advantage of better cracking conditions. The extra tar lost by " carbonization " has led either to more scurf or to additional deposits in the ascension pipes.

Also exceedingly interesting is the section of the paper which discusses hydrocarbon enrichment values in relation to mixtures of coal gas and blue water gas and which shows what variations are possible from different systems of retorts and various conditions of working even using the same coal. The importance of the effect of inerts is strikingly brought out in this section. It is shown, too, how the economic effect of increasing the hydrocarbon enrichment values is bound up with the prevailing prices of coal and coke—how, in one particular comparison, with a decreasing coal-coke price ratio the cost of gas making eventually becomes smaller in an older installation of continuous vertical retorts giving a hydrocarbon enrichment value of 31·3 than in a newer design giving a value of 34·1.

The point is emphasized in the paper that, since the hydrocarbon enrichment values are independent of the addition of blue water gas produced by steaming, the results from unsteamed intermittent, steamed intermittent, and steamed continuous vertical systems can readily be compared, whatever the calorific value of the gas produced may be. And in examining a plant from the point of view of improving its performance, or of measuring the efficacy of some change in operation or design, the figure for the hydrocarbon enrichment value is of great help. If, for example, the figure is found to be low in comparison with the corresponding values from similar plants using similar coal, there is indication of the necessity for ascertaining the causes. Altogether, Dr. Pexton's Yardstick is a most valuable aid to better carbonizing practice.

An Important Rating Judgment

THE recent appeal of the Southern Railway Company to the Court of Railway and Canal Commission against the assessment of £2,180,000 fixed by the Railway Assessment Authority resulted in a reduction of that assessment to £1,077,131. This result is, of course, eminently satisfactory to the Railway Company, but it may not be generally realized that it is also of paramount importance to all public utility undertakers throughout the country.

Railway companies, like gas undertakers, are assessed for rating purposes in accordance with what is termed the profits principle—*i.e.*, the rent which a hypothetical tenant might be expected to pay is fixed with reference to the profit which he might reasonably hope to make out of the undertaking. The correct method of ascertaining the valuation on this basis has been long established and until recent years never disputed. Put shortly, the method is to calculate the net receipts from the published accounts of the previous five years, and from this to deduct some percentage of the Tenant's Capital—*i.e.*, capital which would have to be provided by the tenant to make the initial purchase of coal, residuals, meters, cookers, &c., and to carry on the undertaking until he was able to do so out of incoming receipts.

In recent years, however, certain local authority rating surveyors have discarded this well-established method, and instead of computing the amount required as Tenant's Capital have endeavoured to make some arbitrary division of the net receipts so as to represent a fair and just apportionment between both Landlord and Tenant. In other words, in spite of several legal decisions to the contrary, it was suggested that an assessment for rating must be fixed not only with regard to the amount which a Tenant would be willing to pay, but also in reference to the amount which a Landlord might consent to receive as rent. Where such theories, as applied to the Gas Industry, have been accepted

by Assessment Committees, the only redress open to a gas undertaking is to appeal to Quarter Sessions. Courts of Quarter Sessions are no doubt admirable tribunals in many respects, but can hardly be regarded in general with favour by those who have to raise complicated questions arising from the assessment of public utility hereditaments. It has, in fact, not unnaturally become the usual practice of such Courts to neglect questions of principle addressed to them, and confine their decisions to the fixation of the quantum of the assessment.

Railway Companies are, however, in a more happy position since an appeal lies in virtue of the Railway (Valuation for Rating) Act, 1930, from the Railway Assessment Authority to the Court of Railway and Canal Commission. This Court is presided over by a Judge of the High Court, who is assisted by two other Members of great learning and distinction. The Court is, therefore, one from which decisions on points of principle are to be expected, and such decisions will naturally have great weight throughout the country. The judgment of this Court in the case in question established the following important principles:

(1) That the value of the hereditament depends upon that which the Landlord could get from the Tenant. It may be that the rent which a Tenant might be willing to give would not represent a fair return to the Landlord on his capital, but such a consideration would not be material in computing an assessment for rating.

(2) That a valuation on the profits basis can only be obtained by a calculation based upon the following three factors:

(*a*) The Tenant's Capital.

(*b*) The percentage to be allowed to the Tenant on his Capital.

(*c*) The yearly net receipts to be earned by the Tenant from the undertaking.

With regard to (*b*), Mr. Justice MacKinnon fixed 15%, although in doing so he was careful to point out that this percentage was not to be regarded as a fixed formula, but that it had been applied in consideration of all the facts and circumstances of the case.

The judgment will be of the greatest assistance to all public utility undertakers, as it will render it difficult in future for Assessment Committees and Courts of Quarter Sessions to sanction any departure from the orthodox method of valuation. The decision also illustrates the advantage of an appeal to a Central Authority of sufficient standing to impose uniformity throughout the country.

A Record Demand for Appliances

THE detailed analysis of the accounts for the past year of the Gas Light and Coke Company which appeared on p. 301 of last week's issue of the JOURNAL will have prepared readers for the satisfactory statement which the Governor (Sir David Milne-Watson, LL.D., D.L.) was able to make at the Annual General Meeting. This statement, which will be found reproduced on later pages, contains a number of striking facts, some of them possessing peculiar significance. The small decrease in the sales of gas which was registered in 1933 is replaced on the present occasion by a slight increase, in spite of unprecedented weather conditions. While 1933 presented us with the coldest December for nearly half-a-century, 1934 came along with the warmest December known for all time to the Kew records. These uncertainties in weather conditions, while possibly adding some spice to the even tenor of our lives, are a matter with which the Gas Industry has constantly to reckon. Having so variable a climate to deal with—one offering no indication of what a season is likely to bring forth—plans must, as far as possible, be laid in advance to meet any eventuality, and this fact does nothing to simplify the work of organization and administration. By making every preparation, in ample time, to secure full advantage from the opportunities which wintry weather conditions must present, and by increasing effort to ensure a gas-minded public, the Industry can successfully cope with low thermometer readings. The Gas Light and Coke Company justly pride themselves on being able to register even a slight increase in gas sales during 1934, in spite of the warmest December recorded at Kew. With a more seasonable "wind up," 1934 would, of course, have been a still better year, for the Company started December with a 3% increase in sales over the corresponding period of the previous year.

Putting aside extraneous influences, the Governor showed what success has been attained by the Company in their selling policy. To-day business is not to be obtained as cheaply as was the case in times gone by, but it is to be got, if the proposition commends itself to the prospective customer, and in order to do this the proposition must appeal to the eye as well as to the reasoning faculties. As the Governor said, "we are living in an 'enamel' age, and people will not put up with black cookers and old-fashioned fires any longer. The demand is for a brighter and cleaner note in the kitchen, living room, and bedroom." This demand the Company set themselves out to meet, recognizing that the outlay involved is a good investment; and to a great extent this policy is broadening the basis of business. During 1934 the Company's new gas appliance business broke all previous records; they supplied more new cookers, fires, and water heaters than ever before in the history of the Undertaking. As a matter of fact, the cookers sent out over the twelve months numbered no fewer than 280,000.

The record set up does not apply only to domestic appliances, for the sales of industrial gas apparatus also were in advance of all previous years—a highly gratifying condition of affairs. Partly, of course, it has been due to reviving industrial activity and to factory development in the Company's area—just as the demand for domestic appliances must be attributed in part to the opening up of a large number of new building estates—but in the main the results must be the reward of a progressive policy. The Company "spare no pains to see that suitable apparatus is devised for applying gas heat to every industrial process." That this is the right policy no one will care to deny, and equally sound is the constant endeavour to secure the utmost efficiency in gas consumption. On this point, the Governor remarked that "research carried on at Watson House and elsewhere has led to considerable improvements in the efficiency of gas cookers, fires, and water heaters; they give more heat for less gas. This naturally affects our gas consumptions, but no one will dispute that our right policy should be to take the maximum advantage of all inventions and technical improvements. This is an insurance for the future, and also an encouragement to our consumers to extend the use of gas in their homes." From such a standpoint, the outlook for the Industry affords ample grounds for optimism.

One other statement in the Governor's speech which we note with particular pleasure is that the Company have had considerable success in obtaining public lighting contracts for varying periods with a large number of local authorities. While it may be true that it is generally recognized by the unprejudiced that gas for public

lighting cannot be excelled by any other form of illumination, the need for intensive propaganda appears to be as great now as ever it was.

The "Supervia" Lamp

It is because of our conviction that no opportunity should be allowed to slip of pressing the claims of gas as a public lighting medium that we welcome so cordially the statement above quoted, and for precisely the same reason we experienced equal pleasure during an episode at the meeting earlier last week of the South Metropolitan Gas Company. The accounts of this Company (which, together with the report, were dealt with on p. 302 of the "Journal" dated Feb. 6) showed that there has been an appreciable increase in the gas sold for public lighting; and this was borne out by a statement in the report that the use of high-power gas lighting in main thoroughfares made further progress during the past year, and continues to give unqualified satisfaction. The recent evolution of a new type of directional lamp, which is now being demonstrated at Lewisham and Deptford, "enables the Company to furnish local authorities with a means of street lighting unequalled in æsthetic and practical qualities."

What has been accomplished in this way was more fully detailed by the President (Dr. Charles Carpenter, M.Inst.C.E.) in his Address to the proprietors at the meeting, when he declared that the Company have developed an epoch-making invention, an immense advance in the production of high-power filament light, and one pre-eminently suited for street lighting, by the design of the "Supervia" lamp, which "more effectually than ever develops a quality which is not only brilliant and penetrating, but more nearly approximates to that provided by our great natural light source, the sun," whereas "the latest type of mercury vapour lamp destroys all colour in whatever it illuminates, and gives a ghastly ghostly hue to the complexions of man and woman alike." Not content that so important a matter should be thus dismissed, the President had arranged to have installed and lighted in the meeting place, just behind where he stood, one of these new lamps; and when the other lights in the hall had been lowered, all present were able to assure themselves that Dr. Carpenter had by no means over-stated his case. A working display of this character is, after all, the most effectual way of confounding one's opponents. Though on that occasion the President was "preaching to the converted," there will be other opportunities of making a similarly convincing show of the "Supervia" lamp, for the benefit of those whom it may concern, and the South Metropolitan Company may be relied upon to take advantage of them all. The light is certainly a beautiful one, resulting from a consumption of some 10 c.ft. of gas per hour, and the Company are to be congratulated upon its production.

In the report of Dr. Carpenter's speech which appears in this issue of the "Journal," it will be seen that he stated as one of the difficulties encountered in the matter of public lighting the fact that no generally accepted standard exists as regards the amount of illumination needed in the various types of streets which form the thoroughfares of the Metropolis. He suggested that, for this reason, an interim report from the Departmental Committee now sitting would be useful in assisting the responsible officials to determine what is needed in the boroughs supervised by them. It is because of the feeling that in course of time what is suitable and adequate street lighting may come to be more strictly defined that we like to see the capabilities of gas in this connection kept constantly in the public mind.

During the year 1934, the South Metropolitan Gas Company experienced a decrease in gas consumption over their area of something more than 2%. But as against this there was an addition of more than 4,000 to the number of consumers, and also there has been an increase of three-fourths in the value of contracts entered into for the hire-purchase of appliances. Thus here, again, is the basis of business broadened, though, as the report points out, increased capital outlay is involved, which cannot be immediately remunerative. This, however, will be no more than a temporary drawback; for, as Dr. Carpenter pointed out when referring to the sale or hire-purchase of gas-consuming appliances, "the public certainly does not acquire such articles for decorative purposes, but for more or less daily use, albeit a more restricted one than formerly." Changed conditions in the housing of South London loom ahead, and there was hardly need for the assurance of the President that the Company will do their best to secure that gas shall take its proper place in this development.

Forthcoming Engagements

February.

14.—B.C.G.A.—Midland District Meeting, Birmingham.
15.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.
15.—London and Southern Junior Association.—Meeting and paper by Mr. P. F. Scarth.
16.—Wales and Monmouthshire Junior Association. Meeting at Port Talbot. Paper by Mr. West.
16.—Yorkshire Junior Association.—Meeting at Barnsley. Papers by Messrs. V. J. J. Siddons, R. H. McCulloch, and A. Pickard.
20.—B.C.G.A.—Meeting of Executive Committee, 11 a.m.
21.—B.C.G.A.—South Wales District Meeting at Cardiff.
21.—S.B.G.I.—Council Meeting, 2.30 p.m.

March

7.—Midland Junior Association.—Meeting and Paper by Mr. L. W. Hathaway.
9.—Scottish Junior Association.—Joint Visit to Mining Department, Heriot-Watt College, Edinburgh. Paper by Prof. H. Briggs.
14.—Midland Association.—Meeting at Grand Hotel, Birmingham. Presidential Address of Mr. A. Roberts, of Hereford.
15.—London and Southern Junior Association.—Meeting and Paper by Dr. F. J. Eaton.
16.—Wales and Monmouthshire Junior Association.—Meeting at Newport. Paper by Messrs. H. Canning, Jnr., and J. Wilson.
16.—Western Junior Association.—Meeting at Bath.
20.—Manchester and District Junior Association and Yorkshire Junior Association.—Joint Visit to Sheffield.
23.—Scottish Junior Association (Western District).—Annual Business Meeting. Paper by Mr. J. L. Crossley.

April

4.—B.C.G.A.—Eastern District Meeting, Peterborough.
4.—Midland Junior Association.—Meeting and paper by Mr. F. H. Lesley.
6.—Manchester and District Junior Association.—Meeting at Manchester. Paper by Mr. H. Partington.
6.—Scottish Junior Association (Eastern District).—Visit to Kirkcaldy. Paper by Mr. J. M. Dow.
13.—Yorkshire Junior Association.—Meeting at Bradford. Paper by Dr. H. A. Fells.
20.—Wales and Monmouthshire Junior Association.—Annual General Meeting.

Personal

Among those whom the King has been pleased to approve, on the recommendation of the Lord Chancellor, for the appointment to the rank of King's Counsel is Mr. JACQUES ABADY, whose former association with the Gas Industry is well-known.

Obituary

The death occurred recently of Mr. JOHN HOPE, retired foreman of the Sunderland Gas Company and a well-known local sportsman. Mr. Hope, who was 79 years of age, was for more than 50 years in the service of the Gas Company, and was chief foreman at the Hendon Gas-Works when he retired in July, 1930. He had been in poor health for the past two years.

• • •

The death occurred on Feb. 9 at 14, Vale Court, W. 9, of Mrs. MARY N. MAIN, widow of Mr. Archibald P. Main. The funeral was to-day (Wednesday) at 2.15 p.m.

Correspondence

Gas-Works Plant and Equipment

SIR,—I was very much interested in your leader last week dealing with "Confidence, Plant, and Equipment," &c. Many gas directors and managers are certainly apprehensive as regards the future of their undertakings, not because of any reduction of business, but because of the possibility of their undertakings being absorbed in the near future by some holding company.

Both at works already taken over and at others which might be, urgent constructive work is being postponed or held over to their detriment. In these cases the amalgamations are doing considerable harm to the Industry by postponing possible reductions in cost of manufacture and in prices to the consumer.

Yours, &c.,
"TRAVELLER."

Feb. 8, 1935.

A Question of Morals

SIR,—In attempting to portray an old subject in a new light the originator of the "Ball(y)et" meter advertisement referred to in your columns on Jan. 30 has, it would seem, unwittingly shocked the ethical susceptibilities of your correspondent "Sedate." He wishes to assure "Sedate" and his fraternity that he has no desire to corrupt the morals of the gas industrialist—on the contrary, his intention is to guide his "feet" into safe channels.

Yours, &c.,
"BALLET (METER) MASTER."

Feb. 10, 1935.

GAS LEGISLATION

A Summary of the Position at the end of 1934

By George Evetts, M.Inst.C.E., M.Inst.Gas E., M.Inst.Cons.E.

The striking articles which Mr. Evetts contributed to the "JOURNAL" at the end of last year are now available in the form of a handy book, in similar style to the very popular annual "Technical Signpost" to the "JOURNAL." A general index and marginal annotations make reference easy, and from the many inquiries received while the articles were running, we believe the publication will find a very general welcome from Boards of Directors, Company Secretaries, Municipal Officers, and in many other quarters.

From the "JOURNAL" Office—
pp. 51, bound in cloth, 3s. 6d. net, postage 3d.
Six copies and over, post free.

Institution of Gas Engineers

Dates of 1935 Examinations

The Examinations of the Institution of Gas Engineers in Gas Engineering will be held on April 27, 1935, and in Gas Supply on May 5, 1935. The Oral Examinations will be held in London on June 26, 1935.

Application.—Forms of Application for External Candidates can be obtained from the Secretary of the Institution and have to be returned to him not later than Feb. 28, 1935.

Charles Hunt Memorial Medals.—Candidates for the Diploma Examinations in Gas Engineering (Manufacture) and Gas Engineering (Supply) are eligible for the award of the Charles Hunt Memorial Medals.

Qualifications for Membership of the Institution.—The Diploma in Gas Engineering (Manufacture or Supply) and the Higher Grade Certificate in Gas Engineering will admit to Corporate Membership, the Higher Grade Certificate in Gas Supply to Associateship and the Ordinary Grade Certificate in Gas Engineering or Gas Supply to Studentship of the Institution, provided the other conditions under the By-Laws are fulfilled.

Forms of Application for Admittance to the Institution and copies of the Royal Charter and By-Laws can be obtained from the Secretary of the Institution, 28, Grosvenor Gardens, S.W. 1.

Education Calendar, 1935.

The following dates are of special interest to Examination Candidates, who are reminded that the Gas Education Committee meets on the second Tuesday in every month to consider applications from Students received during the preceding Calendar month:

FEB. 28.

Last date for receipt of applications to sit for Diploma Examinations and Ordinary and Higher Grade Examinations in Gas Engineering and Gas Supply.

APRIL 2.

Last date for receipt of Diploma Theses.

APRIL 27.

Examinations in Gas Engineering—
Ordinary Grade, 2–5 p.m.
Higher Grade—Part I., 2–5 p.m.
Part II., 6–9 p.m.
Diploma Grade—Part I., 2–5 p.m.
Part II., 6–9 p.m.

MAY 4.

Examinations in Gas Supply.
Ordinary Grade, 2–5 p.m.
Higher Grade—Part I., 2–5 p.m.
Part II., 6–9 p.m.
Diploma Grade—Part I., 2–5 p.m.
Part II., 6–9 p.m.

MAY 31.

Last date for receipt of Examination Results in Ancillary Subjects.

JUNE 26.

Oral Examination in London.

JULY 1 TO 5.

Short Course for Teachers in Gas Engineering, Gas Supply, and Subsidiary Subjects at the Westminster Technical Institute, London.

JULY 24.

Publication of Examination Results, prior to which information as to individual results will not be available.

Short Course for Teachers.

Among the Annual Short Courses for Teachers in recognized Technical Colleges and Evening Institutes in England and Wales arranged by the Board of Education is one for a limited number of actual or intending Teachers in Gas Engineering and Gas Supply and Subsidiary Subjects. The Course will be conducted by Dr. P. C. L. Thorne, H.M.I., and other Inspectors of the Board at the Westminster Technical Institute, Vincent Square, London, S.W. 1, from Monday, July 1, to Friday, July 5, 1935, inclusive. No fee will be charged to Teachers from Schools in England and Wales, and certain travelling expenses will be allowed by the Board.

Through the kindness of the Warden and Committee, accommodation will be provided at the Imperial College Hostel, South Kensington, at an inclusive charge of 5s. 6d. per day for bed and breakfast. Other meals will be charged separately according to tariff. Teachers are expected to avail themselves as far as possible of the accommodation provided.

Applications to attend the Course should be submitted to the Board of Education on Form 106U (T) as soon as possible, and in any case not later than March 30, 1935. Forms of Application, together with a Pamphlet containing further particulars of the Course, can be obtained from the Secretary of the Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1.

News in Brief

The Price of Gas has been reduced 3d. per 1,000 c.ft. by the Kennoway and Largo Gas Company, Ltd.

Sanction of the Ministry of Health to the borrowing of £4,500 for the supply of gas to Shaldon has been received by the Teignmouth Urban District Council.

A New Company, the Ayr Gas Company, Ltd., has been formed with a capital of £80,000 in £1 shares. The object of the Company is to acquire the business of the Ayr Gas Company, Ltd., now in liquidation.

Montrose Gas-Works Extensions.—At Montrose Dean of Guild Court on Feb. 4, Montrose Gas Company, Ltd., obtained permission to add to their retort house and to demolish the existing brick chimney at their Works.

The Recent Issue of £50,000 perpetual preference stock made by the Lea Bridge District Gas Company at a minimum price of £107 10s.% was over-subscribed to the extent of more than twice the amount offered for sale.

A High-Pressure Gasholder with a net capacity of 24,700 c.ft. has lately been completed at the Municipal Gas-Works at Glaris, Switzerland, by Escher Wyss & Co., for the long-distance gas supply service to Naefels and Mollis.

A Distribution Manager is required by the Tunbridge Wells Gas Company to be responsible, under the Management, for the control of all business from the consumers' meters. The commencing salary offered is £500 per annum, and allowance for car.

The Payment of Dividends at the following rates is recommended by the Directors of the Tottenham and District Gas Company: 5½% and 5% per annum respectively on the preference stocks; and £6 15s.% per annum on the ordinary stock; all less income-tax.

To Popularize Further the use of the "Newbridge" switch for domestic gas lighting, the Horstmann Gear Company, of Newbridge Works, Bath, inform us that they have arranged for news items on this matter to appear in numerous daily and weekly papers throughout the country.

For the Second Time in a Week, Margate, Westgate-on-Sea, and Birchington were plunged into partial darkness one evening recently by failure of the electricity supply. "The unhappy experiences of sufferers from the failure," the *Isle of Thanet Gazette* remarks, "could not help bringing to their minds the familiar slogan, 'Gas never Fails.'"

Applications are Invited for the position of Secretary and Treasurer by the Corporation of Glasgow Gas Department. Applicants must be experienced and qualified accountants. The position carries a salary of £750 per annum, rising by biennial increments of £50 to £1,000. Further particulars will be found in the advertisement columns of this issue.

An Increase of 6% in the output of gas during past six months has been recorded by the Fraserburgh Gas Department, while the maximum daily output has exceeded all previous records. To further increase the use of gas for heating and cooking, a hire-purchase plan has been commenced by Mr. A. W. Farquhar, the Engineer and Manager, with the full approval of the Town Council.

All-Gas Houses at Durham.—The City Council has accepted the tender of the Durham Gas Company at £887 for lighting and heating new houses in Sherburn Road. Alderman J. T. E. Dickeson said that the gas *versus* electricity "battle" was thoroughly tackled by the Committee and almost every member eventually agreed that it would be much cheaper to use gas for their new housing scheme.

The Illuminating Engineering Society.—By permission of the Council of the Institution of Mechanical Engineers, the next meeting of the above Society will be held in the Hall of the Institution, Storey's Gate, St. James' Park, S.W. 1, on Tuesday, Feb. 19, when a paper entitled "Time Characteristics of Tungsten Filament Lamps for Flashing Signals, Signs, and Beacons" will be delivered by Mr. J. M. Waldram, B.Sc., A.C.G.I., F.Inst.P., and Mr. J. M. Sandford.

Patenting an Invention is not as complicated as one may imagine, and a simple explanation giving minimum costs will be found in "Practical Hints on Patenting," the author of which is the well-known Patent Agent, Mr. M. E. J. Gheury de Bray. This little book is compiled for the guidance of inventors, and covers the main features of patenting. To the manufacturer who is often patenting, this guide will be invaluable, as it gives a service cost for this work. This book may be secured from the Imperial Patent Service, First Avenue House, High Holborn, W.C. 1, free of charge.

Comment on the Competition which the coal industry has had to face from municipal gas and electricity undertakings was made by Mr. John Parry on his election as President of the Manchester Coal Exchange. "What we want to know," he remarked, "now that the collieries are combining, is why they do not obtain a better price for their gas and electricity fuel, considering the large profits made by these undertakings."

Large Areas of South-West London were plunged into darkness on Monday night by a big electricity failure. Among the districts which were affected were Richmond, Twickenham, Teddington, and Whitton, Middlesex. Thanks to the emergency gas lighting, little inconvenience was caused at the Teddington and District Memorial Hospital when the lights failed. At the Whitton Fever Hospital gas was also brought into use.

There was an Attendance of nearly 100 at the sixth Annual Dinner of the Darlington Corporation Gas-Works Sports Club, which was presided over by Councillor T. E. Hudson in the absence, through illness, of the President, Alderman Seaton Leng. The Mayor and Mayoress (Councillor and Miss J. Waters) were amongst the guests. The entertainment included the debut of the Darlington Gas-Works Dramatic Society, who presented a one-act play.

"Technical Data on Fuel."—A Fourth Edition of this valuable work, which is published by the British National Committee of the World Power Conference (63, Lincoln's Inn Fields, W.C. 2) is now in preparation. Any suggestions from members of the Institution of Gas Engineers as to the revision or amplification of the matter appearing in the present Edition, or in regard to the inclusion of additional matter, will be welcomed by the publishing Committee.

The Hamburg Gas-Works, moved by the number of persons who use gas to commit suicide, states the *Daily Telegraph*, have decided to render their gas innocuous to humans by eliminating its carbon monoxide. Plant necessary for this purpose is to cost £230,000, and it will take two years to erect. In 1932, the last year for which statistics are published, 1,398 men and 1,621 women committed suicide, in the whole of Germany, by gas poisoning.

Gas Cookery Demonstrations are being held under the auspices of the Watford and St. Albans Gas Company in the Public Hall, Harpenden, from Monday to Friday of this week. The demonstrations are being given by Miss E. Kirby, of Radiation, Ltd., who recently demonstrated at a local Conservative Club meeting. Two demonstrations are being given daily, and a children's cake-baking competition is being held, for which money prizes, books, and consolation prizes are being offered.

An Exhibition of gas appliances is being held by the Falkirk Town Council Gas Department in the Town Hall from Feb. 12 to 16. Cookery demonstrations are being given twice daily by Miss A. A. Andrew, Cordon Bleu, N.T.S.C., London. The exhibition was formally opened by Mrs. H. J. Kennard, with Provost Stevenson presiding. The Town Hall is to be floodlighted during the exhibition, and from Feb. 4 to 9 the Engineer and Manager, Mr. H. G. Ritchie, arranged to floodlight the old parish church at Falkirk.

An Interesting Leaflet entitled "A Few Pence Per Week" has recently been issued by the Croydon Gas Company to their prepayment consumers in an effort to increase the consumption per consumer. This leaflet sets out clearly and concisely some of the additional means whereby gas can be of service in the home, with full particulars of the very reasonable hire charges offered by the Company. For instance, gas fires supplied on hire, including fixing, from 2d. per week; wash-coppers, 3d. per week; geysers, 6d. per week; and small storage heaters, 4d. per week—all fixed complete, and, in the case of the water heaters, maintained free. Gas irons and pokers are also available on hire-purchase at 3d. per week.

Applications are Invited, we note from the National Press, for the appointment of a General Director to the British Road Tar Association. The applicant must have an extensive technical knowledge of all aspects of road construction and maintenance, together with administrative experience. Full-time services are required which will include visits throughout the country. A salary of £1,500 to £2,000 per annum will be offered commensurate with the qualifications of the successful applicant. Applications, giving age, past experience, present salary and appointment, should be addressed (envelope marked "B.R.T.A.") to the President, Sir David Milne-Watson, care of The Gas Light and Coke Company, Horseferry Road, S.W. 1.

Sir Arthur Duckham Memorial Fund

Official List of Donations from Dec. 1, 1934, to Feb. 8, 1935

Name and Town.	Amount. £ s. d.
The Canadian Gas Association (Toronto)	10 0 0
Donation (1) paid above	£10 0 0
Donations (632) paid previously . .	10,634 0 8
Total Donations (633) paid	£10,644 0 8

South Suburban Gas Company

Directors' Report

The Directors' report of the South Suburban Gas Company for the year ended Dec. 31 last, to be presented at the Ordinary General Meeting on Feb. 22, states that the quantity of gas sold during the year shows an increase of nearly 2%. The consumption was adversely affected by the exceptionally mild weather from the end of November. The additional consumers number 10,836.

Tenders were invited in November last for £200,000 of 4% perpetual preference stock, which was allotted at an average price of £106 10s. 8·44d.%, and an issue of £150,000 of 4% perpetual debenture stock was sold to the Company's Brokers at a price of £108% free of all expense to the Company.

A Bill is pending in Parliament for the purpose of conferring further powers on the Company and will be submitted for approval at the Extraordinary Meeting following the Ordinary Meeting.

Payment is recommended of a dividend for the second half-year of 3% on the ordinary stock, less income-tax, making the dividend for the year 6%, leaving the sum of £4,041 12s. 2d. to be carried forward to the next account.

Cornish Gas Association

Annual Meeting

The Annual Meeting of the Cornish Association was held at Truro on Feb. 6, when Mr. R. Morton, Engineer, Manager, and Secretary of the St. Austell Gas Company, Ltd., was elected President for the ensuing year. Mr. Morton is also Engineer to the St. Blazey Gas Company and Hon. Secretary of the Cornish Gas Salesmen's Circle.

Mr. F. G. Kingwell, of Falmouth, was re-elected Hon. Secretary and Treasurer of the Association.

Floodlighting for the Jubilee

The Annual Dinner of the Illuminating Engineering Society, held at the Trocadero Restaurant on Feb. 5, proved most enjoyable and it also constituted a record in the number attending. The President of the Society, Mr. H. Hepworth Thompson, was in the chair.

Proposing the toast of the Society, the Right Hon. W. Ormsby Gore, First Commissioner of Works, spoke of the remarkable progress made in lighting since the War. A matter with which he and his Department were specially concerned, in view of the approach of Their Majesties' Jubilee, was the floodlighting of public buildings and gardens, and it was a great pleasure to him to have the opportunity of acknowledging publicly the ready generosity and untiring patience of the lighting firms, both equipment manufacturers and supply companies, who had undertaken the lighting of so many famous buildings at their own expense. He felt that floodlighting was going to develop and to play an increasing part, particularly in times of national celebration and thanksgiving.

"Your main work, however," continued Mr. Ormsby Gore, "lies in other fields—in the lighting of our homes and buildings of all kinds and of our public places. It is difficult to estimate too highly the benefits we have gained in health and safety, and the more pleasant and efficient regulation of our common life, from the great improvement in lighting for general use. But the benefits might be far greater if the public generally were more alive to the serious effects of inefficient and unsuitable lighting. You have a great work to do in educating the public in these questions and in making them realize the loss of time in industry, the detriment to health due to unconscious eye-strain, and the inefficiency and irritation due to inconvenience which, through long custom, pass unnoticed. I should like to persuade every manufacturer in the country to visit the Home Office Industrial Museum and see for himself the striking proofs and illustrations of the difference which good lighting can make in the factory. He would realize that modern lighting is not a luxury but a sound investment, even from the purely commercial standpoint, often resulting in savings in time and an increase in efficiency which very soon pay for the initial expenditure."

Referring to the part the Illuminating Engineering Society is taking in connection with the Ministry of Transport Committee which is examining the question of more efficient and uniform street lighting, Mr. Ormsby Gore said he understood that the Society's action in putting forward the views of the Illuminating Engineering profession on these questions had already been most helpful.

Responding to the toast, Mr. Hepworth Thompson pointed to the need for a mean standard of illumination for workshops and factories.

Mr. C. C. Paterson, O.B.E., Past President of the Society, proposed "The Guests," and Mr. C. Valon Bennett, President of the Institution of Gas Engineers, and Prof. W. M. Thornton, O.B.E., President of the Institution of Electrical Engineers, replied. Mr. Valon Bennett said how admirable were the aims of the Society, and urged all interested in lighting to become members. He reminded his listeners that gas was responsible for the lighting of millions of homes and shops, and thousands of miles of streets, in the country, and mentioned that floodlighting by gas was spreading through the length and breadth of the land.

Edinburgh Gas Department

Acquisition of Two Gas Companies

At a recent meeting of Edinburgh Town Council, recommendations were submitted in connection with the acquisition of two gas undertakings, namely, the South Queensferry Gas Company, Ltd., and the Broxburn Gas Company. For some time past, the Corporation has been in negotiation with both concerns with regard to the question of acquisition, and, following the successful conclusion of negotiations, an extension of the area supplied with gas by Edinburgh would be carried through.

The Town Council agreed that when the negotiations for the acquisition of the two companies are successfully carried through, application be made to the Board of Trade for a Special Order under Section 10 of the Gas Regulations Act, 1920, to approve of the agreements which would be entered into, and for authority to extend the limits of gas supply to take in the Parishes of Dalmeny, Abercorn, Ecclesmachan, Uphall, Livingstone, Midcalder, and Kirknewton, as suggested by the Engineer, and also to get authority from the Board for increasing the extra charge for gas supplied outside the city. Tribute was paid during the discussion to the work done by Mr. Walter Muter, the Convener of the Gas Sub-Committee, and Mr. J. Jamieson, the Engineer and Manager, for their work in connection with the negotiations.

Midland Gas Industry Dinner and Dance

For several years past the Midland Association of Gas Engineers and Managers have organized a Dinner and Dance for their members and friends. It has now been decided to hold a Dinner and Dance in Birmingham on Monday, March 18, for all those engaged in the Gas Industry in the Midlands. This will include members of the various Associations connected with the Gas Industry and manufacturers of plant and appliances, &c.

The function will take place at Tony's Ballroom, Hurst Street, Birmingham, and will comprise a Dinner to be followed by a Dance, which will include a Cabaret.

Substantial support has already been promised for this function, which it is hoped will be the outstanding social event in the Gas Industry of the Midlands district. The price of the tickets is 12s. 6d. each, exclusive of wines, and early application is desirable.

"The Marketing of Coke"

A Correction

Shortly after last week's "JOURNAL" had gone to Press, we were asked by Dr. F. M. H. Taylor to make two alterations to the text of his article "The Marketing of Coke." By that time, however, a number of copies were already in print, and for those readers who received copies containing the erroneous text we insert this correcting paragraph. The first sentence under the caption "Labour Costs" on p. 311 should, of course, read: "As a guide to the amount of stoking necessitated, one stoker would be required for each 1,000 to 1,500 tons of coke consumed per annum, or for each 12,000 lbs. of steam per hour from steam boilers."

Commercial Gas Company Accounts

The accounts of the Commercial Gas Company have certain features in common with the other two Metropolitan Companies. The revenue from gas has decreased, expenditure on distribution has increased, but residual products have yielded substantially more. The price of gas has remained at 9d. per therm.

The sale of gas is less by 467,045 therms or 2·77%. The number of ordinary meters has declined from 22,671 to 21,577 and prepayment installations from 93,092 to 92,704. The total decrease in consumers is 1,498 or 1·29%. Stoves on hire are less at 111,673 (against 118,452), but most of the decrease must be due to an increase of the appliances owned by consumers and this is reflected in an increase of £35,905 in the balance-sheet item "Expenditure in suspense, including balances on hire-purchase account."

A decrease in gross income and an increase in gross expenditure have resulted in less profit and the dividend is proposed at 5½% against 5¾% in 1932 and 1933, 5⅞% in 1931, and 6% for several previous years.

The capital account shows expenditure during the year on freehold property £6,613 (against £26,274 in 1933), new and additional buildings, plant, &c., £2,197 (against *nil*), and nothing on meters, appliances, and fittings (against £4,367); depreciation is £16,680 (against £9,955), leaving a net reduction of £7,870 against an addition of £20,686 in 1933. The total expenditure is now 1s. 11·4d. per therm sold at £1,594,486 and balance overspent is £201,233. No further ordinary stock has been cancelled in exchange for debenture stock, although £21,950 was exchanged in 1933. A resolution will be submitted to the proprietors to authorize the issue of capital under existing legislation, and another resolution to sanction the application being made at present to the Board of Trade under section 1 of the Gas Undertakings Act, 1929, to increase the borrowing powers of the Company.

The following is a summary of the revenue accounts for the two years:

Receipts.

—	1934.	1933.
	£	£
Gas (*less* public lighting expenses)	561,503	585,000
Rentals	89,225	93,473
Rents and transfer fees	1,312	931
	£652,040	£679,404

Expenditure.

—	1934.	1933.
	£	£
Coal (*less* residuals)	64,278	82,108
Wages (carbonizing)	44,429	45,084
Purification	9,381	8,672
Salaries of engineers, &c.	16,206	16,020
Repairs and maintenance of works and plant	75 257	67,655
Total net manufacture	209 551	219,539
Distribution	209 350	196,490
Co-partnership	8,875	13,313
Rent, rates, and taxes	34,638	35,114
Management	48,453	51,164
Miscellaneous, including superannuation (£19,911), &c.	26,618	29,472
Total expenditure (*less* residuals)	£537,485	£545 092
Balance to net revenue	114,555	134,312
Dividend and interest	135,330	138,852
Deficit	£20 775	£4,540

Receipts from gas are down by £23,497 and from rentals by £4,248. Rentals are less on account of the smaller number of consumers and the increase in consumers' own appliances. Sales of gas are less partly owing to the economy of the newer appliances, partly owing to the reduction in consumers and reduction in population in certain parts of the district due to the migration from the central areas and partly no doubt due to the very intense competition from electrical undertakings in this district.

Coal cost less at £248,619 (against £255,950) for 244,644 tons (against 250,008 tons) or 20s. 3·90d. per ton (against 20s. 5·71d. per ton). Residuals were better, due to improvements in coke (due to better make per ton and better price), from £129,532 to £134,098, breeze from £2,745 to £3,437, tar from £37,373 to £40,511, and ammonia from £4,192 to £6,296. The total residual receipts were thus £184,342 against £173,842, an increase of £10,500. Repairs and maintenance of works is more by £7,602 at £75,237, but other manufacturing charges show little change, so that the cost per therm sold into gasholder is 3·07d. against 3·13d. last year.

Distribution charges are £12,860 more, owing chiefly to increases in repairs and maintenance of mains and services and repair and renewals of stoves. Salaries and wages were £364 less, mains and services £6,837 more, ordinary meters £790 less, stoves £7,424 more, slot meters and fittings £417 less, and maintenance £170 more.

Co-partnership is £4,437 less at £8,875, due to the reduction of ¼% in the ordinary dividend. For every sum beyond 5% paid to the ordinary shareholders the co-partners receive an equal amount. The reduction of ¼% in the dividend thus reduces the sum available for the co-partners by 33⅓%.

Rents, rates, and taxes are a little less and management appreciably less due mainly to savings in collection and general charges. Miscellaneous charges are less by £2,854, almost entirely on account of less law and parliamentary charges.

Balance of net profit is £19,757 less at £114,555 and dividend and interest requirements are £3,522 less at £135,330 due to the reduction in dividend of ¼%, amounting to £4,437, which is partly offset by increased interest charges.

There is thus a deficit of £20,775 against £4,540 and carry forward is reduced from £31,849 to £11,074.

It can be seen that the Company have met a reduction in revenue and increased cost of working in some departments by economies in certain directions, better bye-product receipts, the sacrifice of £4,437 each by shareholders and co-partners, and a draft of £20,775 from carry-forward. The deficiency of £20,775 amounts to just over 0·30d. per therm sold.

All funds have been credited with proper interest, and the Reserve Fund was £76,831 and Special Purposes £53,010 at the end of the year.

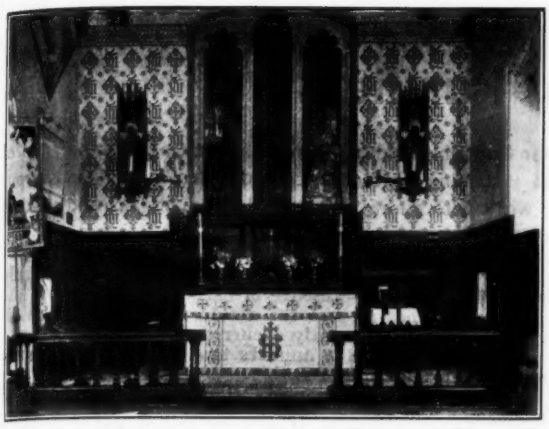
The balance-sheet shows cash £11,376, investments £87,725, sundry accounts due to the Company £139,155, and suspense accounts (including hire-purchase) £44,582. Against these items are sundry creditors £91,295 and temporary loan £281,000.

Following is the statement of gas made and sold, the chief working results and costs of working, and prices realized for residuals.

It will be seen that the gas unaccounted for is rather better, but that gas made per ton of coal is less. As an offset more coke has been made for sale per ton of coal carbonized, and better prices have been realized for all the residual products.

—	1934.	1933.
	Therms.	Therms.
Quantity made	17,437,650	17,986,890
Quantity sold—		
Private consumers	16,030,985	16,441,635
Public lighting	21,400	19,520
Correction for temperature and pressure	334,260	392.535
	16,386,645	16,853,690
Quantity used on works	522,070	520,965
Quantity accounted for	16,908,715	17,374,655
Quantity not accounted for	528,935	612,235
	3·03%	3·40%

	1934.	1933.
Coal cost per ton	20s. 3·90d.	20s 5·71d.
Therms made per ton of coal carbonized	71·28	71·95
Coke made for sale per ton of coal carbonized (cwt.)	10·11	9·63
Tar made per ton of coal carbonized (galls.)	9·83	9·60
	s. d.	s. d.
Prices realized—		
Coke, per ton	21 8·24	21 6·17
Breeze, per ton	5 3·52	4 5·03
Tar, per gall.	0 4·04	0 3·74
Liquor, per butt	1 5·60	0 11·35
	Per Therm Sold. d.	Per Therm Sold. d.
Expenditure (*less* residuals)	7·87	7·76
Gas, rentals, &c.	9·55	9·67
Balance, being profit	1·68	1·91
Dividend and interest	1·98	1·98
Deficit	0·30	0·07



The Chancel and Altar beautifully illuminated by gas.

GAS LIGHTING FOR CHURCHES

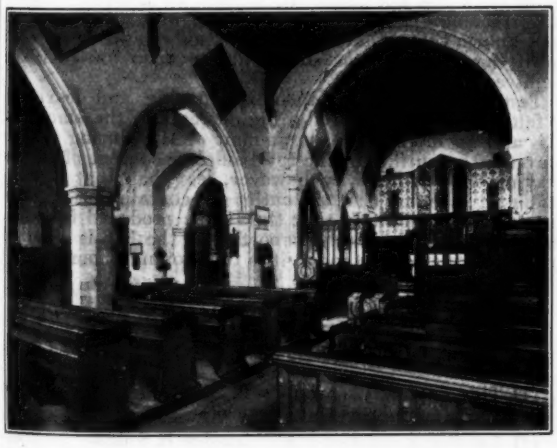
An Interesting Installation recently completed by the South Suburban Gas Company at West Wickham Parish Church.

Our readers will recall the photographs we published a few weeks ago of the very fine gas lighting of a church at Harlow, carried out by the Bishop's Stortford, Epping, and District Gas Company.

It is gratifying to note that there appears to be a growing appreciation of the merits of this type of illumination for such buildings, and, in this connection, we took the opportunity the other day of inspecting a similar installation recently effected in the fine old Parish Church of West Wickham, in Kent. This church, which is of considerable antiquity, occupies a beautiful position on the crest of a hill overlooking the Hayes-Addington Road, and close to the scene of very extensive building activities in the Hayes and West Wickham district—so that this new form of lighting may well attract considerable attention and prove of value to the Industry generally.

Indeed, favourable comment has already been aroused in the local Press by at least one correspondent, who remarked that the church may now well be called the best artificially illuminated church in Kent. This unsolicited testimonial from, presumably, a layman, is certainly a welcome sign that the Industry's efforts do not pass so unnoticed by the public as we are sometimes rather tempted to believe.

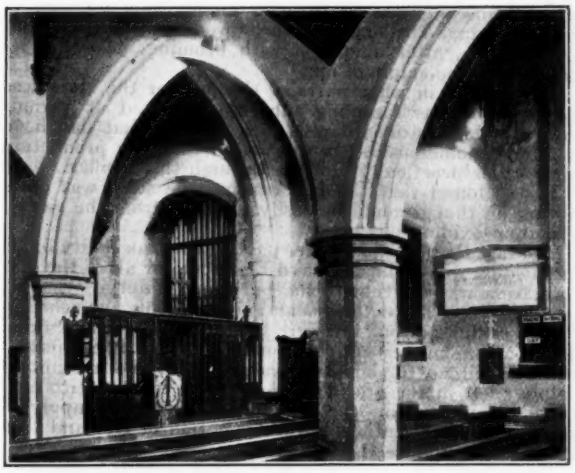
The installation, which was carried out by the South Suburban Gas Company, consists of six 3-light gas burners with directive reflectors, set well up on the walls, and lighting the congregation from behind, so that no direct light can shine on the eyes. Four of these lamps serve to illuminate the nave and the other two the north aisle, controlled in pairs by three Sugg main cocks situated at the door of the church.



A General View of the Church with the gas lighting in operation.

The Chancel Lighting.

The chancel lighting is particularly effective, the light sources being completely invisible to the congregation.



Showing the positioning of the directive gas lamps high up in the arches.

Four gas lamps similar to those in the body of the church are situated high up behind the chancel arches, shedding a beautifully soft yet brilliant light upon the altar. These lamps are individually controlled by means of "Newbridge" switches.

Additional gas lamps, all on by-pass, serve to illuminate the gallery of the church, as well as the organ, bell tower, and porch, the whole lighting installation providing a very even and efficient illumination.

We cannot do better than quote further of the comments of the correspondent in the local newspaper, whose general impressions of the installation coincide fairly accurately with our own. He said: "The installation of gas lighting is certainly very effective. I found it difficult to see the lamps, hidden as they were behind the columns and recesses. The result produced was such that the beautiful old church, with its fine oak ceiling, was ablaze with light, and the altar stood out with hidden lamps shining upon it. Surely the heat from gas must be the deciding factor that gas lamps should be installed in such public buildings."

It is indeed gratifying to observe from this last sentence that the value of the heat from gas lighting is also being realized by the public. Our photographs, which were taken by the gas lighting, show how effective is the installation.

Cheaper Gas for North Berwick.—The Town Council of North Berwick has decided that as from May, discount will be given to large consumers of gas in that town. Bailie Minto maintained that large consumers of gas were in a position to pay for what they consumed, and he thought it would be putting the small consumer at a premium. He would prefer to see the price of gas reduced by 1d. or 2d. per 1,000 c.ft. Provost Eeles informed Bailie Minto that the Gas Committee were of opinion that large consumers of gas helped to reduce the price for smaller consumers.

Automatic Control of Dundee Lighting.—A Report to the members of Dundee Corporation Gas Sub-Committee by Mr. R. D. Robertson, Public Lighting Superintendent, states that the introduction of automatic controllers for the street gas lighting system would mean an annual cost of £1,407. In addition, there would be an initial outlay of £23,588. Dundee has 7,653 gas lamps. Mr. Robertson estimates there would be a saving of £1,100 in wages, and a reduction in the consumption of gas, resulting from 2,000 lamps out of the 7,653 being extinguished at midnight, of £1,356.

Thio-Bacterial Action in Purifiers

By W. F. THORNE, B.Sc., F.C.S.,
Chief Chemist to the Bournemouth Gas and Water Company

Our Contributor deals with an interesting phenomenon of gas "staining" which occurred when a purifier was put to work with a new charge made from bog ore and sawdust

Some years ago it was observed that when a purifier was put to work with a new charge made from bog ore and sawdust clean gas became "stained"* in the course of its passage, this condition prevailing for seven days. Leaky valves were ruled out by tests.

At first the trouble was confined to oxide made up from bog ore and sawdust, but later the trouble occurred with a charge of re-made oxide (*i.e.*, burnt oxide and sawdust).

Bog Ore.

In order to prove that the stain was produced by a sulphur compound (and by inference H_2S) a sample of the stained gas was passed through an aqueous solution of caustic soda. The exit gas then produced no stain, but the solution, after oxidation with bromine, gave the reactions for the sulphate ion.

To discover in what parts of the purifier the stain was produced, a gas sampling tube was inserted at various points and at various depths in a purifier that had been working anomalously. It was found that the production of H_2S was practically uniform through the purifier.

It was found that the H_2S causing the stain was quite normal in that it could be easily removed from the gas by a normal oxide.

The fact that air alone after passing through faulty oxide or sawdust was stained showed that some or all of the H_2S formation was internal to the purifying material—that is, it would appear that the gas and air were only the vehicles.

Two samples of bog ore were found to contain 0·05% and 0·16% of sulphur respectively, and after air had been passed through till no further H_2S was evolved, the amount of sulphur left in the ore in each case was too small to estimate. This confirms the fact that an external supply of sulphur is not essential for the formation of H_2S and that the ore can produce H_2S *per se*.

These facts suggested that the formation of H_2S might be due to bacterial decomposition of organic matter, and in order to test this hypothesis, tests were made for thio-bacteria as follows: The material under test was made to a paste with water and other compounds were added as shown below, the whole being contained in a stoppered flask in the vapour space of which was suspended a lead acetate paper. The flasks were then kept in a dark cupboard. The following is a summary of the tests made:

Tests on Sawdust.

Test No.	Material.	$CaCO_3$.	CS_2.	$(NH_4)_2SO_4$	Condition of Test Paper.
1	Fresh sawdust	*	*	*	No stain after 9 days
2	Old sawdust	*	*	*	Stain after 2 days
3†	,,	*	..	..	No stain after 7 days
4	,,	..	..	..	No stain after 7 days

* Indicated that this compound was added to test mixture.
† On the seventh day a drop of CS_2 added to the mixture produced a dark stain in a few hours.

Thus it would appear that fresh sawdust cannot produce H_2S under the above conditions, whereas old sawdust can produce H_2S from CS_2 but not *per se*.

Tests on Bog Ore.

Test No.	Material.	$CaCO_3$.	CS_2.	$(NH_4)_2SO_4$	Lactose.	Condition of Test Paper.
5	Bog ore	*	*	..	..	Heavy stain after 1 day
6	,,	*	..	..	..	No stain after 4 days; heavy stain after 5th day
7	,,	..	..	..	..	Stain after 4 days; heavy stain after 5th day
8	,,	*	*	*	..	Stain after 5 days
9	,,	*	*	*	*	No stain after 7 days

* Indicated that this compound was added to test mixture.

* By "stained" is meant that the gas contained H_2S sufficient to colour a lead acetate paper in three minutes.

From tests 5, 6, and 7 it appears that bog ore rapidly produces H_2S in the presence of carbon disulphide; it also produces H_2S *per se*, but the action is delayed. This delayed action has frequently occurred during purification.

From tests 5 and 8 it appears that ammonium sulphate delays the production of H_2S.*

From test No. 9 it appears that lactose prevents H_2S formation.*

Test No. 5 was repeated after the ore had been exposed to light and air for seven days, and in this case a slight stain was visible after three days.

By comparing this result with the original result of test No. 5 it is apparent that exposure to light and air delays H_2S production.*

Re-Made Oxide.

A sample of re-made oxide was subjected to the thio-bacteria test by adding CS_2, and a stain was produced in three days.

A part sample of this oxide was treated with water and the sawdust and oxide were separated by flotation. Thio-bacteria tests were then applied to the sawdust, wash water, and oxide. With the sawdust a stain developed in less than one day but with the wash water and oxide no stains were produced at all.

Part of the sawdust separated by flotation was exposed to light and air for eight days and then tested for thio-bacteria, when a slight stain developed after fourteen days.

A bulk consignment of re-made oxide when tested for thio-bacteria gave a slight stain in 2½ days. The consignment was stored in two separate heaps.

(1) Stored in △-shaped heap; each side of the triangle was about 6 ft. The oxide was used almost immediately.

(2) Spread in a layer 1 ft. thick for 22 days. During this time it was turned over by hand several times to expose to light and air. The oxide was then put into a purifier.

(NOTE.—After storing for ten days cereals were found growing from the oxide.)

After fourteen weeks both these charges produced a stain. It is possible that the exposure that the second charge had in 22 days was not sufficient, so that no positive evidence is forthcoming from this test. From previous experience it is known that no anomalous working was produced when purifying material was stored in the open for twelve to eighteen months.

Tests for sulphur compounds entering and leaving a "faulty" purifier showed a big decrease in the amount of CS_2 and an increase in the amount of H_2S during passage through the purifier. The total sulphur content of the gas leaving the purifier was, however, less than that entering it, despite the fact that the outlet gas contained H_2S. This proves quite definitely that the H_2S is produced from CS_2 and further that a small proportion of the H_2S is absorbed by the purifier even though it is functioning anomalously.

Conclusions.

The results of this investigation can be summarized thus:

(1) This anomalous production of H_2S seems to be due to the action of thio-bacteria.

(2) (*a*) Fresh sawdust cannot evolve H_2S under any conditions. (*b*) Old sawdust can produce H_2S from CS_2 but not *per se*.

(3) Bog ore can produce H_2S *per se*, but the action is delayed; but it can produce H_2S more rapidly from CS_2.

(4) The formation of H_2S from re-made oxide is due to thio-bacteria action in the sawdust portion only.

(5) The thio-bacteria can be effectively eliminated by exposing the sawdust and oxide to light and air for a sufficiently long period.

* These conclusions are in agreement with known facts concerning thio-bacteria. A small quantity of $CaCO_3$ was added in each test to make the mixture slightly alkaline, so as to imitate the conditions in the purifiers.

A Method of Assessing Gas-Making Results

by
S. PEXTON, Ph.D.

This Paper, just released for publication, was presented by Dr. S. Pexton, Ph.D., B.Sc., of the Gas Light and Coke Company, to a meeting of the North-Western Section of the Institute of Fuel at Manchester on Nov. 21, 1934.

This present paper is an attempt to simplify the correlation of gas-making data from different types of carbonizing plant using the same class of coal. It arises from the study of the results of a number of large-scale tests, mostly on steam vertical retorts. The assessment takes the form of a single number, termed the Hydrocarbon Enrichment Value, and, as such, it points more clearly to those cases where further investigations are required.

The method of assessment was developed very largely in collaboration with L. Silver. Originally it had special reference to the tests mentioned herein, but it can be applied with equal facility to the necessary working data from

(1) Horizontal retorts and coke ovens,
(2) Continuous and intermittent vertical retorts which are steamed, and
(3) The carburetting process in water gas manufacture.

Information in respect of some of these plants has been presented to this Institute by T. Hardie,[1] and to the Institution of Gas Engineers by E. G. Stewart,[2] J. S. Thorman,[3] and R. W. Hunter.[4]

The development of the idea is an extension of the work described by H. Hollings[5] in a paper to the Institution of Gas Engineers. In that paper the analysis and comparison of results were facilitated by the adoption of inert-free volumes and calorific values, and in the present paper the treatment has been simplified, as in the definition below, by the same procedure.

The Hydrocarbon Enrichment Value.

The Hydrocarbon Enrichment Value can be defined as *the product of the inert-free volume of a gas and its excess calorific value over* 318. An algebraic expression for the hydrocarbon enrichment value is given below; the derivation is shown in the Appendix.

$$E = \frac{V}{100{,}000}\left[H - 318\left(1 - \frac{N}{100}\right)\right] \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

Where E = the hydrocarbon enrichment value in therms.
V = the volume* of purified gas as made, measured in c.ft. per ton of coal or, in the case of C.W.G., per unit of oil.
H = the calorific value† of the purified gas as measured in B.Th.U. per c.ft.
318 = the calorific value‡ of hydrogen or carbon monoxide.
N = the percentage of inerts, *i.e.*, CO_2, O_2, and N_2, in the purified gas.

* Volumes of gas relate to measurement at 60° F. and 30 in. pressure of mercury when the gas is saturated with water vapour.

† Calorific values relate to gross calorific values determined according to the Gas Referees' Notification.

‡ The calorific values of hydrogen and carbon monoxide calculated on this same basis from Rossini's [6] data are 319·0 and 316·3 respectively.

The Hydrocarbon Enrichment Value as an Index of Cracking Conditions.

The inert-free or combustible part of gas consists of hydrogen, carbon, monoxide, and mixed hydrocarbons (*i.e.*, methane, ethane, ethylene, benzene, &c.). For all practical purposes hydrogen and carbon monoxide have the same calorific value of 318 B.Th.U. per c.ft.* The upper diagram in fig. 1 represents a yield of 12,000 c.ft. of inert-free gas per ton of coal, made up as follows:

4,000 c.ft. of mixed hydrocarbons, having a calorific value of 1,200 B.Th.U. per c.ft. (48 therms)
plus 8,000 c.ft. of hydrogen *plus* carbon monoxide having a calorific value of 318 B.Th.U. per c.ft. (25·44 therms)
or 12,000 c.ft. of mixture having a calorific value of 612 B.Th.U. per c.ft. (73·44 therms).

What has been referred to as the hydrocarbon enrichment value is represented graphically by the *area which projects above the* 318 *B.Th.U. per c.ft. calorific value line* in the upper diagram of fig. 1—*i.e.*, 4,000 c.ft. (1,200 − 318) = 3,528,000 B.Th.U., or 35·3 therms. This *area*, when distributed over the whole volume basis, as in the lower diagram, is responsible for increasing the inert-free calorific value of the mixture from 318 to 612 B.Th.U. per c.ft.—*i.e.*,

$$12{,}000 \times (612 - 318) = 3{,}528{,}000 \text{ B.Th.U.}$$

enrichment. Suppose now that the total volume of the mixture is increased by the addition of 3,000 c.ft. of gas having an inert-free calorific value of 318 B.Th.U. per c.ft., the total yield of inert-free gas would then be 15,000 c.ft. made up as follows:

4,000 c.ft. of mixed hydrocarbons having a calorific value of 1,200 B.Th.U. per c.ft. (48 therms).
plus 11,000 c.ft. of hydrogen *plus* carbon monoxide having a calorific value of 318 B.Th.U. per c.ft. (34·98 therms)
or 15,000 c.ft. of mixture having a calorific value of 553·2 B.Th.U. per c.ft. (82·98 therms).

The hydrocarbon enrichment value under the new conditions—*i.e.*, 15,000 × (553·2 − 318) = 3,528,000 B.Th.U.—has remained the same because no change has occurred in respect of the enriching hydrocarbons themselves. The same shaded enrichment area in fig. 1 has merely been distributed over a larger volume base line, thus diminishing proportionately the level of the inert-free calorific value of the mixed gas as measured above the 318 B.Th.U. line—*i.e.*, 11,000 (612 − 318) = 15,000 (553·2 − 318).

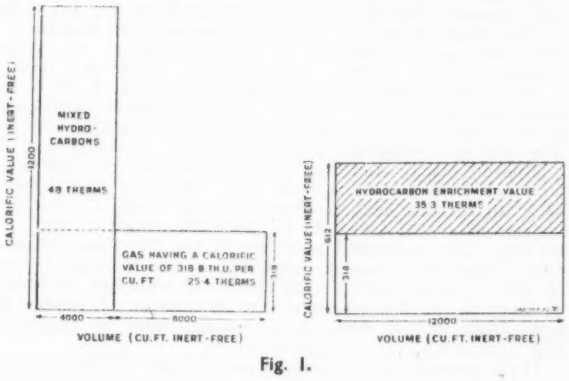


Fig. 1.

The volume yield of inert-free gas can be increased by the further carbonization of the coke residue at a higher temperature, by the addition of blue water gas by steaming, by the addition of producer gas, and by the introduction into the retorts of waste gases, some of the carbon dioxide of which is reduced to carbon monoxide. None of these changes will affect the hydrocarbon enrichment value, unless it involves an alteration in the yield or calorific value of the mixed hydrocarbons—*e.g.*, by a change in the conditions of cracking or by alteration in the amount of gas lost by leakage, or by the introduction of hydrocarbons from some source other than the coal.

The simplicity of application, and the usefulness of the hydrocarbon enrichment value, are due to the fact that for given conditions it is a single number, depending solely upon the yield and calorific value of the hydrocarbons themselves and independent of variation in the volume of inert-free gas per ton of coal.

The Destructive Distillation of Coal.

Hydrocarbon enrichment values for the gas from tight retorts or from a water gas carburettor are indices of the

* *Cf.* T. F. E. Rhead [7].

TABLE I.—*Carbonizing Results at Various Temperatures.*
[From the 20th Report of the Gas Investigation Committee.]

	Per Ton of Coal Substance.							
Test No.	44	43	39	33	25	15	3	Test E
Temperature, °C.	344	435	527	630	726	819	918	979
Therms—								
In gas (including H_2S and NH_3)	5·4	21·8	32·8	50·7	64·8	67·0	79·2	85·5
In tar and pitch	13·5	26·4	31·0	32·7	29·8	25·3	19·5	19·0
In coke	298·6	265·8	249·8	230·6	224·7	223·1	216·0	215·9
In loss, partly as retort carbon (by difference)*	7·3	10·8	11·2	10·9	5·6	9·5	10·1	9·0
In coal	324·8	324·8	324·8	324·9	324·9	324·9	324·8	329·4
Hydrocarbon enrichment values	3·75	14·0	20·1	28·2	33·9	31·8	35·8	38·7

* Any carbon not included as coke or tar, *i.e.*, mainly scurf on retort walls and pitchy deposits from ascension pipes, &c.

cracking conditions to which gas and tar have been subjected. To develop this observation clearly it will be helpful to refer to some of the researches on the destructive distillation of coal and particularly to those described by E. V. Evans in his Cantor[4] and William Young Memorial Lectures.[5]

Briefly, it may be stated that by destructive distillation the therms in the original coal are distributed among the products, gas, tar, coke, and retort carbon* without any substantial loss. This is well illustrated by the results in Table I., which are quoted from the 20th Report of the Gas Investigation Committee,[6] and refer to the distillation of a Nottinghamshire gas coal in the Corbett Woodall experimental plant at Leeds University.

The increased thermal yields of gas at the higher distillation temperatures are obtained partly by the progressive decrease in the volatile content of the coke, and partly by the further decomposition of the hydrocarbons which are normally associated with low-temperature tar.

An insight into the relationship between the yields of gas and tar in low and high temperature carbonization can be gained from fig. 2 which is the diagrammatic representation given by E. V. Evans,[5] but modified in one slight detail. Fig. 2 is based upon the following considerations:

Laboratory results showed that a typical Durham gas coal, when distilled in a special manner up to 500° C., yields, on the basis of one ton of coal substance, 25 therms of a very rich gas, 50 therms of "primary tar," and a non-caking residue. If this "primary tar" while in a nascent state, is passed over a contact material at 550° C. there will be produced 30 therms of a tar having all the characteristics of low-temperature tar and a further 10 therms of rich gas. The loss of 10 therms is represented by incompletely decomposed pitchy material deposited on the contact mass. The non-caking residue from the "primary distillation" will, on further heat treatment up to 1,000° C., yield 35 therms of gas of 400 B.Th.U. per c.ft. calorific value, but no tar. The combined products of the "primary distillation" and the secondary cracking of the "primary tar" at 550° C. are, therefore, 35 therms of rich gas, 30 therms of normal low-temperature tar, 35 therms of poorer gas remaining in the non-caking residue, and 10 therms of pitchy material on the contact mass.

If the secondary cracking of the nascent "primary tar" is carried out at 750° to 800° C. instead of 550° C., there will be produced a further 25 therms of rich gas and 20 therms of a tar similar to horizontal retort tar. The loss of 5 therms is accounted for by the presence of free carbon left on the contact mass, and not recovered in the tar. The combined products from "primary distillation," the secondary cracking of "primary tar" at 750° to 800° C., and the distillation at 1,000° C. of the non-caking residue from the "primary distillation" are, therefore, 85 therms of gas, 20 therms of high-temperature tar, and 5 therms of free carbon left in the contact mass. These gas and tar yields, on the basis of one ton of coal containing 8% of ash and moisture, are 78 therms and 18·5 therms respectively. All subsequent results will be referred to this basis.

The cracking temperature of 750° to 800° C. was chosen because it was found to lead to the optimum laboratory results. Higher temperatures result in further degradation of gas and tar to free carbon which is left on the contact material.

These results in respect of high temperature carbonization are very similar to those obtained under very favourable conditions of large-scale practice. Evans was therefore led to study the temperature conditions in large-scale horizontal retorts, and concluded that during the period that tar was being evolved (60% of the total carbonizing time) the temperature in the surrounding mass of partly carbonized coal did not exceed 800° C. The temperature inside the retort at the time of discharge was about 1,000° C. These deductions relate, of course, only to the particular conditions considered—*i.e.*, well-filled retorts producing 74 gaseous therms per ton.

Cracking Conditions in Horizontal Retorts.

For the present purpose the optimum conditions of cracking are defined as those under which the maximum amount of the carbon in the coal is converted into gaseous hydrocarbons. In this connection "undercracking" leads to a high yield of tar-hydrocarbons; "overcracking" leads to a loss of therms from the gas and tar by the deposition of carbon. From the nature of the intermittent high-temperature carbonizing process as practised on a large scale, part of the volatile matter must be under-

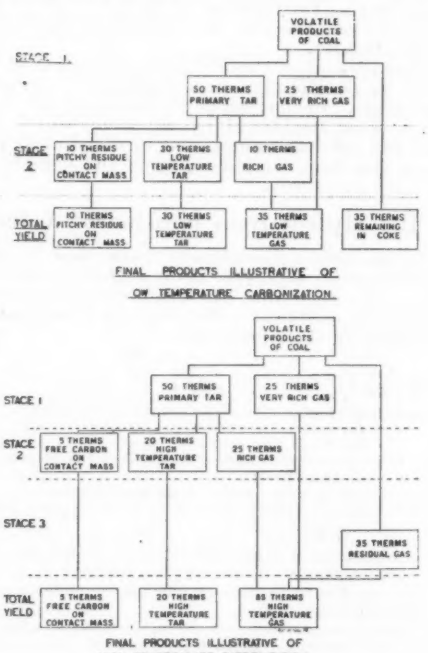

VOLATILE PRODUCTS OF COAL
STAGE 1
50 THERMS PRIMARY TAR
25 THERMS VERY RICH GAS
STAGE 2
10 THERMS PITCHY RESIDUE ON CONTACT MASS
30 THERMS LOW TEMPERATURE TAR
10 THERMS RICH GAS
TOTAL YIELD
10 THERMS PITCHY RESIDUE ON CONTACT MASS
30 THERMS LOW TEMPERATURE TAR
35 THERMS LOW TEMPERATURE GAS
35 THERMS REMAINING IN COKE
FINAL PRODUCTS ILLUSTRATIVE OF LOW TEMPERATURE CARBONIZATION
VOLATILE PRODUCTS OF COAL
STAGE 1
50 THERMS PRIMARY TAR
25 THERMS VERY RICH GAS
STAGE 2
5 THERMS FREE CARBON ON CONTACT MASS
20 THERMS HIGH TEMPERATURE TAR
25 THERMS RICH GAS
STAGE 3
35 THERMS RESIDUAL GAS
TOTAL YIELD
5 THERMS FREE CARBON ON CONTACT MASS
20 THERMS HIGH TEMPERATURE TAR
85 THERMS HIGH TEMPERATURE GAS
FINAL PRODUCTS ILLUSTRATIVE OF HIGH TEMPERATURE CARBONIZATION.

Fig. 2.

cracked (in the early stages) and part overcracked (in the later stages), and consequently optimum cracking conditions, in the ideal sense, cannot be attained in practice.

During recent years most horizontal retort installations have passed through a period when light charges were carbonized at combustion chamber temperatures somewhat lower than at present. The higher combustion chamber temperatures, adopted subsequently, resulted in a redistribution of therms in the products, dependent upon those cracking conditions which existed previously. If, for example, with light charges and lower temperatures, undercracking did not predominate, then it is not surprising that increasing the combustion chamber temperatures, without altering the weight of charge, led in the direction of overcracking of gas and tar. The thermal yield of gas, under the new conditions, was at least as high and in many cases higher than under the lower temperature conditions. The yield and quality of the tar, however, had been sacri-

* Any carbon not included as coke or tar—*i.e.*, mainly scurf on retort walls and pitchy deposits from ascension pipes, &c.

ficed and difficulties from stopped pipes and excessive naphthalene production resulted. These defects were largely remedied, with further reduction in cost of gas-making, by modifying the charging arrangements so as to increase the weight of charge.

The sequence of changes mentioned above is illustrated by experiments A, B, and C in Table II., which were carried on in the experimental plant of the Gas Light and Coke Company. Experiment D represents a rather different result of increasing the weight of charge—viz., the introduction of the conditions of undercracking in the early stages of carbonization, because of the use of combustion chamber temperatures somewhat lower than is appropriate for the increased weight of charge.

The setting used contained two full-sized horizontal retorts, occupying the position corresponding to the lowest tier in a normal setting of 10 retorts. Prior to each experiment the particular retort in use was made gastight by sealing the pores of the refractory with carbon by the carbonization of a number of charges, with a slight pressure in the retort. In all experiments the carbonization was continued until gas evolution had practically ceased. The foregoing points represent differences which have affected the results, when compared with large-scale practice. In all other respects the retorts were charged and operated normally, with due observance of all the factors likely to affect the results.

Each experiment represents the average of the number of charges carbonized successively under the stated conditions. The tar yields were determined as accurately as possible, but such are the difficulties involved that little value can be placed upon conclusions based only on tar measurements.

Experiments B and C refer to light and heavy charges respectively, carbonized at the same high combustion chamber temperatures. It should be emphasized that, because of the special features of this experimental setting and because of the continuation of the carbonizing period until gas evolution had practically ceased, the internal retort temperatures at the time of discharge must have been higher than those normally employed in practice. In experiments A and D with lower combustion chamber temperatures, the internal retort temperatures at the time of discharge would be approximately 1,000° to 1,050° C., which are more usual in normal carbonizing practice. These points are stressed because they are mainly responsible for the high thermal yields of gas in experiments B and C.

TABLE II.—*The Gas Light and Coke Company's Experimental Plant. Setting of Two Silicious Fireclay Horizontal Retorts.*

Each retort—D section, 24 in. by 16 in. by 20 ft.
Coal used—Durham run-of-mine (crushed to pass 2-in. mesh).

Experiment	A	B	C	D
Weight of coal per charge (cwt.)	12·4	12·4	15·6	13·4
Duration of carbonization (hrs.)	11·0	9·75	12·5	11·0
Temperature in combustion flues at—				
Combustion arch (° C.)	1,250	1,350	1,350	1,300
Level of retorts near waste gas exit (° C.)	975	1,065	1,070	1,000
Yields per ton of coal adjusted to 8% ash *plus* moisture in coal—				
(*a*) Gas therms	77·5	81·7	81·2	76·0
(*b*) Tar (galls.)	10·1	5·6	9·2	13·1
(*c*) Tar (therms)	19·3	10·7	17·7	25·1
(*a*) + (*c*) "Volatile therms"	97	92	99	101
Gas (inert-containing)—				
Volume (V., c.ft./ton of coal)	13,310	15,050	14,480	13,330
Calorific value (H., B.Th.U./c.ft.)	582	543	561	570
Inert content (N., %)	6·3	4·6	4·7	7·8
Gas (inert-free)—				
(*d*) Volume (V'., c ft./ton of coal)	12,480	14,350	13,790	12,290
(*e*) Calorific value (H'., B.Th.U./c.ft.)	621	569	589	618
(*a*) Therms in gas (as above)	77·5	81·7	81·2	76·0
(*f*) V'. × 318/100,000	39·7	45·6	43·9	39·1
(*a*—*f*) Hydrocarbon enrichment value	37·8	36·1	37·3	36·9

The reason for introducing the experiments in Table II., and those which follow in Table III., does not lie in the results themselves but in the assistance they give in establishing the usefulness of the hydrocarbon enrichment value, in throwing light upon the cracking conditions within a retort. It is much simpler to establish this point first of all with results obtained without steaming.

Turning now to the results themselves, the thermal yields of gas were 77·5, 81·7, 81·2, and 76·0. It is believed that the lower yield of gas in Experiment A was mainly accounted for by the greater amount of volatile matter left in the coke in consequence of the lower end-temperature of distillation. At the time of these experiments the necessary experimental technique to investigate this point had not been developed. The tar yields in the respective experiments were 10·1 galls. (19·3 therms), 5·6 galls. (10·7 therms), 9·2 galls. (17·7 therms), and 13·1 galls. (25·1 therms). A very considerable part of the gas in Experiment B had been made from overcracking of the tar. This overcracking of tar, and gas also, was due to the large free space in the retort acquiring, at an early stage in the carbonization, a temperature very much in excess of that desirable to preserve at a maximum the valuable gaseous hydrocarbons, methane, ethane, and ethylene. Cracking in a free space is the condition usually associated with the excessive formation of naphthalene and "free carbon" in tar. The high thermal yield of gas in Experiment B was due to gas, derived from tar decomposed compensating for the loss of carbon by the decomposition of gaseous hydrocarbons.* This is reflected in the very low yield of "volatile therms."

Experiment C relates to the same combustion chamber temperature as in Experiment B, but with a very heavy charge. This change has eliminated the undesirable features associated with the conditions of Experiment B. The thermal yield of gas was substantially the same as in Experiment B, but the tar yield was higher at 9·2 galls.

Attention should now be directed to those characteristics of the gas which are normally taken as indications of the conditions of cracking—*e.g.*, the volume yields and calorific values upon an inert-free basis, as shown in lines (*d*) and (*e*) of Table II. It will be seen that the gas yield in Experiment B was high at 14,350 c.ft. (inert-free), and the corresponding calorific value was low—569 B.Th.U. per c.ft. Both these figures are indications of overcracking. In Experiment C the volume yield of gas was lower at 13,790 c.ft. (inert-free), and the corresponding calorific value was higher at 589 B.Th.U. per c.ft. In respect of Experiment A, it should be borne in mind that the coke retained some of the volatile matter which, in Experiments B and C was included in the gas. The same applied to some extent in Experiment D. If this volatile matter had been expelled under the conditions existing in the retort at the end of carbonization, it would have yielded mainly hydrogen and some carbon monoxide—*i.e.*, gas having an inert-free calorific value of 318 B.Th.U. per c.ft. Assuming for the moment that there would have been yielded about 1,000 c.ft. of such gas, the figures in respect of Experiment A in lines (*d*) and (*e*) of Table II. would be modified to 13,500 c.ft. and 600 B.Th.U. per c.ft. The conclusion would then have been drawn that the cracking conditions were less severe than in Experiment C.

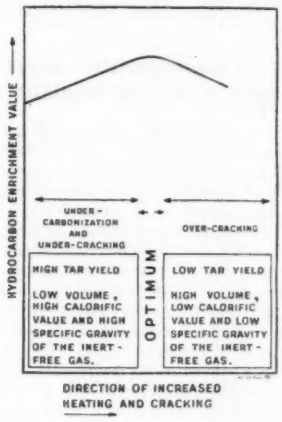

HYDROCARBON ENRICHMENT VALUE
UNDER-CARBONIZATION AND UNDER-CRACKING
OVER-CRACKING
HIGH TAR YIELD
LOW VOLUME, HIGH CALORIFIC VALUE AND HIGH SPECIFIC GRAVITY OF THE INERT-FREE GAS.
OPTIMUM
LOW TAR YIELD
HIGH VOLUME, LOW CALORIFIC VALUE AND LOW SPECIFIC GRAVITY OF THE INERT-FREE GAS.
DIRECTION OF INCREASED HEATING AND CRACKING

Fig. 3.

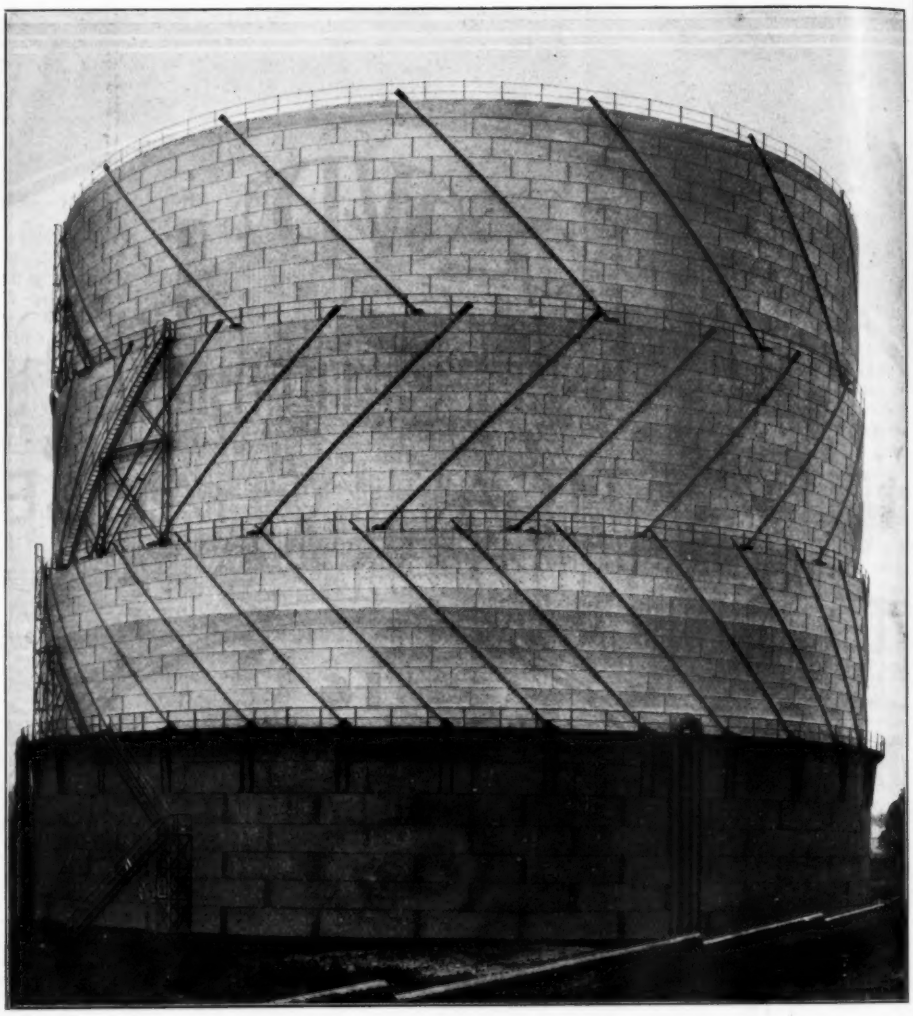
This was probably true, but the experimental evidence presented at this stage only permits the conclusion that the conditions in Experiment A represented "underheating,"† and "undercracking," relative to those in Experiment C.

Experiment D is an example of "undercracking" as reflected in the high tar yield, the low yield of inert-free gas and its relatively high calorific value. The results of this experiment may bear upon the experience of those who have found that the limitations in the supply of producer gas for heating the retorts precluded the attainment of the full advantages of heavier charges.

The last three lines of Table II. show the steps involved in the calculation of hydrocarbon enrichment values from the thermal yield and inert-free volume of gas. It might be helpful to consider these results in conjunction with fig. 3, which is a curve of the hydrocarbon enrichment values plotted against the "Degree of Heating and Crack-

* A small part of the increased gaseous thermal yield may be due to absorption of sensible heat from the setting at the expense of producer fuel, enabling endothermic cracking reactions to occur.

† "Underheating" has reference to the coke only in contrast to "undercracking," which refers to the volatilized products.



Steel Tank	....	....	162' 6" dia. x 36' 4" deep.
Inner Lift	....	....	154' 0" „ x 35' 6" „
Middle Lift	....	....	157' 0" „ x 35' 6" „
Outer Lift	....	....	160' 0" „ x 35' 6" „
CAPACITY	....	....	2,000,000 cu. ft.

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There may be cases in practice where the disadvantages from "overpulling," as outlined above, are partly compensated for by the avoidance of gas leakage through the retort walls. Such cases are associated with the difficulties of maintaining the minimum pressure difference across the retort walls at all times, and throughout the installation.

Comparison of Results from Two Horizontal Retorts of Different Size.

Table III. shows results obtained from two differently sized horizontal retorts heated under identical conditions. Experiment G does not quite fall into line with experiments E and F because only one ascension pipe was employed in this experiment. The peculiarity of the results obtained may be due to more severe cracking of the gases passing through the whole length of the retort, coupled with a slightly incomplete carbonization of the charge at that end of the retort with the closed pipe.

The average results from the two sizes of retort are shown in columns 5 and 9 of Table III. The thermal yields of gas were very similar in the two cases, but the inert-free gas from the oval retort had a somewhat higher calorific value at 605 B.Th.U. per c.ft. compared with 595 for the D retort. The tar yield was also higher in the oval retort at 11·4 galls. compared with 9·2 galls. per ton of coal in the D retort. All these features tend to confirm the belief that the larger the section of the retort the greater is the amount of degradation of gas and tar for given conditions of heating.

TABLE III.—*The Gas Light and Coke Company's Experimental Plant.*

Setting of two silicious fireclay horizontal retorts—One retort: D section, 24 in. × 16 in. × 20 ft. Other retort: Oval section, 21 in. × 15 in. × 20 ft. Coal used: Durham nuts (size, ⅜ to 1¾).

Experiments carried out on one retort at a time. Coal charge laid with end edges rather more than 6 in. clear of iron mouthpieces.

Type of Retort	D Retort.				Oval Retort.			
Experiment	E	F	G*	Average.	H	K	L.	Average.
Weight of coal per charge (cwt.)	12·0	12·4	12·5	*12·3*	10·1	10·6	10·2	*10·3*
Duration of carbonization (hrs)	10·0	11·0	10·75	*10·6*	8·2	10·0	9·0	*9·1*
Temperature in combustion flues at—								
Combustion arch, °C.	1,350	1,300	1,300	*1,320*	1,350	1,300	1,300	*1,320*
Level of retorts at waste gas exit, °C.	1,080	1,020	1,080†	*1,060*	1,080	1,020	1,080†	*1,060*
Yields per ton of coal adjusted to 8% ash *plus* moisture in coal—								
(*a*) Gas (therms)	79·8	79·5	77·9	*79·1*	79·5	79·7	78·7	*79·0*
(*b*) Tar (galls.)	10·2	9·2	9·3	*9·2*	10·8	12·5	10·8	*11·4*
(*c*) Tar (therms)	19·6	17·7	17·8	*18·4*	20·7	22·5	20·7	*21·3*
(*a*) + (*c*) "Volatile therms"	99·4	97·2	95·7	*97·5*	100·2	101·2	99·4	*100·3*
Gas (inert containing)—								
Volume (V. c.ft./ton of coal)	14,370	14,320	13,990	*14,230*	14,090	13,530	13,540	*13,690*
Calorific value (H.B.Th.U. per c.ft.)	555	555	557	*556*	564	582	581	*577*
Inert content (N%)	5·8	7·5	6·4	*6·8*	4·7	5·2	4·1	*4·7*
Gas (inert free)—								
(*d*) Volume (V^1 c.ft./ton of coal)	13,540	13,240	13,100	*13,260*	13,430	12,830	12 980	*13,050*
(*e*) Calorific value (H^1B.Th.U. per c.ft.)	589	600	595	*597*	592	614	606	*605*
(*a*) Therms in gas (as above)	79·8	79·5	77·9	*79·1*	79·5	78·7	78·7	*79·0*
(*f*) $V^1 \times 318/100{,}000$	43·1	42·1	41·7	*42·1*	42·7	40·7	41·3	*41·5*
(*a*—*f*) Hydrocarbon enrichment value	36·7	37·4	36·2	*37·0*	36·8	38·0	37·4	*37·5*

* Only one ascension pipe used. All other experiments made using two ascension pipes.
† Increased volume of combustion gases passing over the retort under test

Hydrocarbon Enrichment Values in Relation to Mixtures of Coal Gas and Blue Water Gas.

The Gas Industry is already familiar with West's Steaming Curves shown in fig. 4, which correlate the diminishing calorific value with increased make of gas per ton, as steaming is increased. A simplified form of this is given in fig. 5, in which inert-free calorific values are plotted against inert-free volume yields.

If the horizontal line C.V. = 318 is drawn, then the area $v\,(h - 318)$ enclosed above this line by the ordinates of any point on the curve represents the thermal value in excess of a calorific value of 318 for the gas yield corresponding to this point. This area is constant, wherever the point is chosen on the curve, which therefore is a rectangular hyperbola whose asymptotes are the lines $v = 0$ and $h = 318$. The removal of gas of 318 calorific value can continue as far as the point Z, by which time only 4,000 c.ft. of hydrocarbons of 1,150 calorific value remain. The hydrocarbon enrichment value is equivalent to this volume of hydrocarbons multiplied by their excess calorific value over 318. This single number, therefore, completely characterizes the steam curve appropriate to a particular plant and coal.

A modification of a nomogram developed by H. Hollings,* for the analysis of the results from steamed retorts is given in fig. 6. Using his nomenclature, but a value of 318 instead of 320 for the calorific value of carbon monoxide and hydrogen, the relationship developed by him can be extended:

$$T_m \left(1 - \frac{318}{H_m}\right) = T_c \left(1 - \frac{318}{H_c}\right) = E$$

where

H_c and T_c are the inert-free calorific value and the thermal yield per ton of straight coal gas.

H_m and T_m are the inert-free calorific value, and the thermal yield per ton of the straight coal gas mixed with blue water gas.

E is the hydrocarbon enrichment value.

In the original nomogram, the point of intersection of a straight edge with the centre reference line is characteristic of one set of conditions of straight coal gas manufacture in that it represents

$$T_m \left(1 - \frac{318}{H_m}\right) \text{ or } T_c \left(1 - \frac{318}{H_c}\right) \text{ or E.}$$

It can therefore be scaled with hydrocarbon enrichment values, as shown in the modified nomogram in fig. 6.

The thermal yield of a mixture of coal gas and blue water gas can be related to its calorific value and inert content by the following equation (see Appendix 1), which also includes the hydrocarbon enrichment value (E).

Therms in mixed coal gas and blue water gas per ton of coal

$$= \frac{HE}{H - 318\left(1 - \frac{N}{100}\right)} \quad \ldots\ldots (2)$$

where

H B.Th.U. per c.ft. is the calorific value of the mixture,

N% is the inert content of the mixture,

and

E is the hydrocarbon enrichment value corresponding to the hydrocarbons in the mixture.

This equation implies that the amount of mixed coal gas and blue water gas which can be made—*e.g.*, in steamed retorts—*is proportional to the hydrocarbon enrichment value*. The numerical factor of proportionality,

$$\frac{H}{H - 318\left(1 - \frac{N}{100}\right)}$$

is dependent jointly upon the calorific value and inert content of the mixture. When the calorific value of the mixture to be made is 500 B.Th.U. per c.ft., the numerical values appropriate to the various inert contents are:

2·411 for 8% inerts in the mixture.
2·339 for 10% inerts in the mixture.
2·271 for 12% inerts in the mixture.

For hydrocarbon enrichment values of 32 and 37 respectively, the thermal yields of gas from steamed vertical

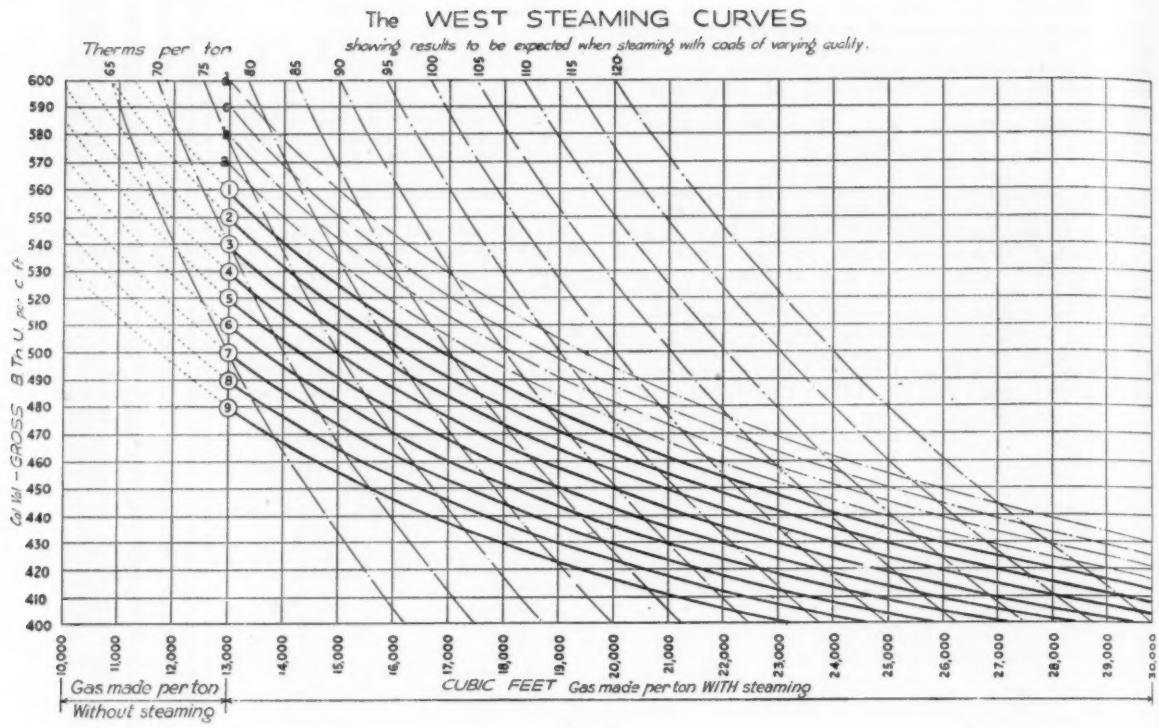

Fig. 4.

retorts corresponding to H = 500 B.Th.U. per c.ft. for various values of N are:

	E = 32.			E = 37.		
	N = 12.	N = 10.	N = 8.	N = 12.	N = 10.	N = 8.
Therms of mixed coal gas and blue water gas per ton coal.	72·66	74·85	77·14	84·03	86·56	89·21

Variations such as these are possible from different systems of retorts and various conditions of working, even when using the same coal. It is interesting to note that

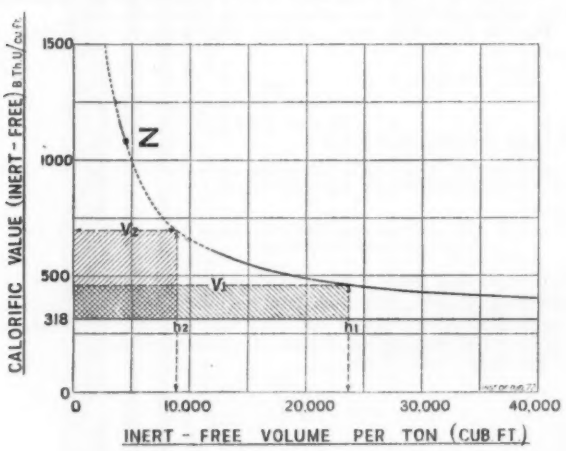

Fig. 5.

1% of extra inerts in the mixture, when the calorific value is 500 B.Th.U. per c.ft., reduces the gaseous yield by 1·1 to 1·5 therms per ton of coal. The importance of the effect of inerts is increased at lower calorific values—*e.g.*, at 400 B.Th.U. per c.ft. the thermal yield of gas per ton of coal in a plant which can produce a hydrocarbon enrichment value of, say, 35 will be 116·5 and 123·1 therms for 1% and 10% of inerts respectively. At this very low calorific value the coal required to produce a given number of therms is increased by nearly 3% for 1% of extra inerts and the amount of coke for sale is increased correspondingly by much more than 3%.

Whether it is an economic advantage to replace additional inerts by blue water gas, and so obtain an increased thermal yield of gas, depends upon the relative cost of the additional blue water gas compared with the straight coal gas. This is made clear in a recent paper by F. B.

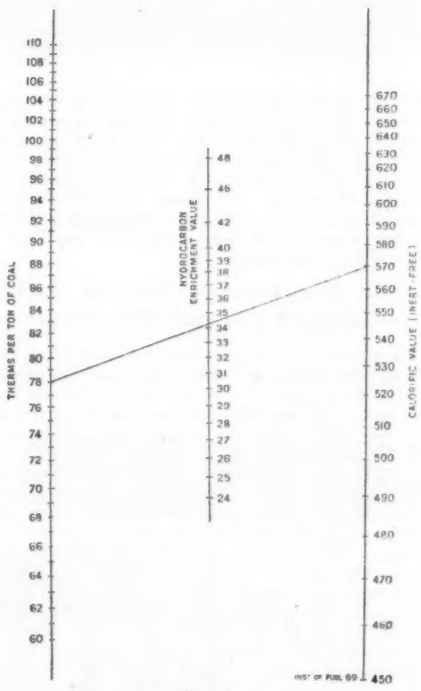

Fig. 6.

Richards.[11] For example, his Table I. refers to the carbonization of South Yorkshire screened coal in continuous vertical retorts. The prices of coal and coke and the various production and capital charges are such that the mixed gas of lower calorific value, with increased steaming, is cheaper than the higher grade gas. In these circum-

stances, since blue water gas must therefore be cheaper than straight coal gas, the replacement of additional inerts by blue water gas will result in a reduction in cost of gas production. It is shown that in other circumstances the replacement of additional inerts by blue water gas will increase the cost of gas production.

Similarly, the economic effect of increasing the hydrocarbon enrichment values is bound up with the prevailing

TABLE IV.—*Comparative Costs of Producing Gas in Two Installations of Continuous Vertical Retorts Having Different Hydrocarbon Enrichment Values.*

Installation	Older Design			Newer Design		
Calorific Value	512			507		
Coal	Run-of-Mine Durham			Run-of-Mine Durham		
Throughput per in. major axis per retort per day	0·091			0·102		
Therms per ton	72·8			78·8		
Hydrocarbon enrichment value	31·3			34·1		
Tar per ton, galls.	8·6			10		
Dry fuel, % on weight of coal	13·8			13·6		
Gross coke make with 5% H_2O (% on weight of coal)	75·5			74·8		
Net price of coke	12s. 6d.	18s. 3d.	25s.	12s. 6d.	18s. 3d.	25s.
Costs in pence per therm—						
Dr. Coal at 22s. ton	3·627	3·627	3·627	3·351	3·351	3·351
Labour	0·129	0·129	0·129	0·129	0·129	0·129
Fuel	0·300	0·437	0·600	0·273	0·398	0·545
Capital	0·412	0·412	0·412	0·380	0·380	0·380
Total *Dr.*	4·468	4·605	4·768	4·133	4·258	4·405
Cr. Gross coke	1·556	2·272	3·112	1·424	2·079	2·848
Tar at 2½d. gall.	0·295	0·295	0·295	0·317	0·317	0·317
Surplus steam*	0·394	0·394	0·394	0·268	0·268	0·268
Total *Cr.*	2·245	2·961	3·801	2·009	2·664	3·433
Net cost per therm	2·223	1·644	0·967	2·124	1·594	0·972

* No credit has been given for production of greater quantities of steam than 1,600 lbs./ton.

prices of coal and coke. Using many of the assumptions of Richards, the costs of gas making are given in Table IV. for various coal and coke prices for two installations, one of older design having a hydrocarbon enrichment value of 31·3, and one of more modern design having a hydrocarbon enrichment value of 34·1. In spite of these differences, the figures clearly show that with a decreasing coal-coke price ratio the cost of gas making eventually becomes smaller in the older installation.

Large-Scale Results Interpreted from the Standpoint of Hydrocarbon Enrichment Values.

Since the hydrocarbon enrichment values are independent of the addition of blue water gas produced by steaming, the results from unsteamed intermittent, steamed intermittent, and steamed continuous vertical systems can readily be compared, whatever the calorific value of the gas produced may be.

A preliminary survey shows that intermittent systems fall into a group whose hydrocarbon enrichment values fall between 35 and 37·5. The intermittent systems concerned include coke ovens, horizontal retorts, and three types of intermittent vertical installations. The data for the calculation of these figures have been derived from tests conducted by the Gas Light and Coke Company; experience shows that normal working usually confirms the test figures, if no fundamental changes in operation are made. Differences may arise due to coal gas leakage and waste gas entry, and a special investigation has often confirmed such a diagnosis. There have been examples of a plant exhibiting a decreasing hydrocarbon enrichment value with increasing age; this, however, recovers its normal value on resetting the retorts. Waste gas analyses have strengthened this conclusion. One particular installation of steamed intermittent retorts gave a very high hydrocarbon enrichment value, which is probably due to the lower internal retort temperature, which arises out of the practice in this plant of steaming throughout the carbonization. An interesting case occurred in which a change in the steaming programme of another steamed intermittent retort system brought about an increase of 1·5 therms in the hydrocarbon enrichment value.

The results from the steamed continuous vertical retorts fall into a group of lower hydrocarbon enrichment value. They range from 32 therms in the case of a plant of older design to 35 in the case of more modern plant. The plant with the lowest value was also producing the lowest yield of tar, which is indicative of drastic cracking conditions.

This overcracking may be due to irregularities in the travel of coal, or an inappropriate zoning of temperatures in the retort. This drawback has occupied the close attention of plant designers, who are aiming at a greater degree of control of cracking conditions. If they succeed they will make the continuous vertical retort a still more attractive system.

In examining a plant from the point of view of improving its performance, or of measuring the efficacy of some change in operation or design, the figure for the hydrocarbon

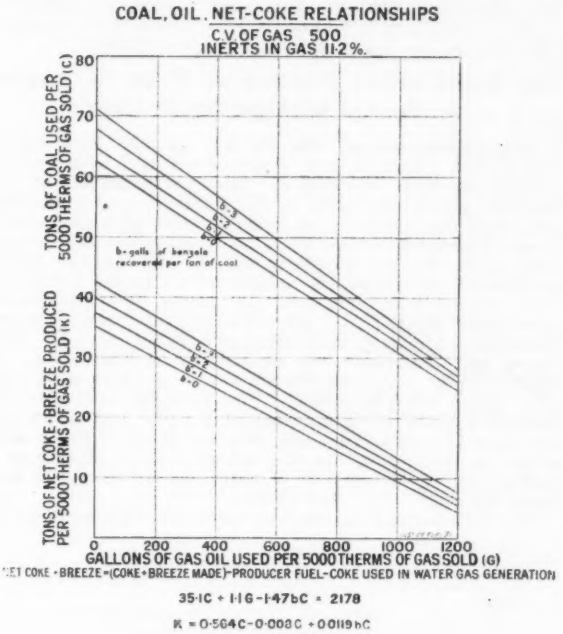
COAL, OIL, NET-COKE RELATIONSHIPS
C.V. OF GAS 500
INERTS IN GAS 11·2%.
TONS OF COAL USED PER 5000 THERMS OF GAS SOLD (C)
TONS OF NET COKE + BREEZE PRODUCED PER 5000 THERMS OF GAS SOLD (K)
b-galls. of benzole recovered per ton of coal
GALLONS OF GAS OIL USED PER 5000 THERMS OF GAS SOLD (G)
NET COKE + BREEZE = (COKE + BREEZE MADE) − PRODUCER FUEL − COKE USED IN WATER GAS GENERATION
35·1C + 1·1G − 1·47bC = 2178
K = 0·564C − 0·008C + 0·0119bC

Fig. 7.

enrichment value, based upon careful determinations of gas volume, calorific value, inert content, and coal weights is of great value.

If a figure be found which is low in comparison with the corresponding values from similar plants using similar coal, there is an immediate indication of the necessity for a more detailed investigation.

The discrepancy may be traced to coal gas leakage through the retort walls. The magnitude of this effect was first pointed out by A. Parker,[12] and much attention has since been paid to this aspect by those controlling operations within the Industry and by the plant contractors

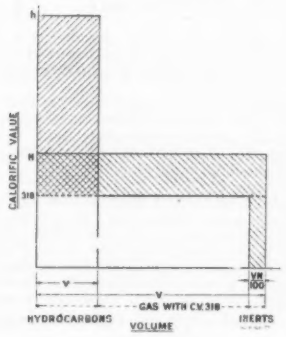

Fig. 8.

using improved materials and methods of construction. Methods of leakage determination have been fully reviewed by A. H. Clucas.[13] Sufficient information in regard to coal gas leakage can be obtained by the method based upon waste gas analysis[5] providing that the sampling and analyses are carried out with skill.[14]

Another explanation of the low figure may be the abnormally high volatile matter left in the coke. This can be determined approximately by a weight method, but more informatively by any method that involves the recarbonization of the coke and the measurement and

analysis of the evolved gases. Such methods* have been described by J. G. King,[15] K. Bunte,[16] and W. Ludewig.[15, 17] A. E. Haffner will also refer to a similar method in the discussion of this paper.

Any other cause of a low hydrocarbon enrichment value must be due to an alternation in cracking conditions, and in such cases a knowledge of the tar yield and quality will provide valuable indications of under or over cracking.

An unsuitable distribution of combustion chamber temperatures, a change in the free space in the retorts, a modification of the steaming technique, or any other change in methods of operation may then be sought as a cause of the depression in hydrocarbon enrichment value. The beneficial effect of subsequent changes in operations upon the cracking conditions can be followed by observing increases in the hydrocarbon enrichment value.

The Hydrocarbon Enrichment Value as Applied to the Oil Carburetting Process.

The application of the concept of the hydrocarbon enrichment value is not confined to the hydrocarbons yielded in coal distillation. The manufacture of carburetted water gas involves the production of blue water gas, and the addition of hydrocarbons of high calorific value derived from the cracking of oil in the carburettor. Just as in the case of coal gas hydrocarbons, the enrichment value of the oil gas hydrocarbons is the product of their inert-free volume and the excess of their calorific value over 318 B.Th.U. per c.ft., and this product is conveniently expressed in therms per gallon of oil. This figure will determine the proportion of blue water gas which can be added to the oil gas to produce mixed gas of a given calorific value. The presence of inerts will neutralize some of this enrichment value just as in coal gas manufacture, and where the use of oil is to be minimized in the production of a given number of therms of carburetted water gas, it is naturally necessary to keep down the inerts to a low figure.

The hydrocarbon enrichment value for a gallon of oil is:

$$E_{oil} = \frac{1{,}000}{g}\left[H - 318\left(1 - \frac{N}{100}\right)\right]$$

where
g = gallons of oil per 1,000 c.ft. of carburetted water gas,
H = calorific value of the carburetted water gas,
and
N = its inert content.

The Relationships Between the Quantities of Coal, Oil, Benzole, and Coke Involved in the Production of Town Gas.

From many points of view it is of value to express, in the form of equations or graphs, the relationships between the weight of coal carbonized, the volume of oil carburetted, the quantity of benzole extracted, and the weight of coke yielded during the manufacture of, say, 5,000 therms of town gas of a given calorific value. The relationship between these quantities of coal, oil, and benzole can be expressed as

$$E_1C + E_2G - E_3B = \frac{5{,}000}{H}\left[H - 318\left(1 - \frac{N}{100}\right)\right] \quad . \quad . \quad . \quad (3)$$

where C = tons of coal carbonized per 5,000 therms of town gas.
G = galls. of gas oil used per 5,000 therms of town gas.
B = galls. of benzole extracted per 5,000 therms of town gas.
N = % inerts in town gas.
E_1 = the hydrocarbon enrichment value per ton of coal carbonized.
E_2 = the hydrocarbon enrichment value of carburetted water gas per gall. of oil. For present purposes, it is assumed that all the hydrocarbons in carburetted water gas are derived from gas oil, although a small amount of methane is to be found in the blue water gas.
E_3 = the hydrocarbon enrichment value of a gallon of benzole. The extraction of benzole clearly diminishes the enrichment value of the mixed gas and its removal will involve the carbonization of more coal or the use of more oil in the carburettor. The volume of 1 gall. of benzole in the vapour form can be taken as 40 c.ft., and its calorific value can be regarded as 4,000 B.Th.U. per c.ft. E_3 will therefore be

$$40\,(4{,}000 - 318) = 1{\cdot}47 \text{ therms per gall.}$$

If the coal gas produced has a hydrocarbon enrichment value of 35·0, while the town gas calorific value is 500 B.Th.U. per c.ft. and the inert content of the town gas is 11·2%, then the equation (3) can be rewritten.

$$35{\cdot}0\ C + 1{\cdot}1\ G - 1{\cdot}47\ bC = 2{,}178,$$

and this equation has been graphed for different numbers "b" of gallons of benzole per ton of coal in fig. 7.†

The lower lines in the same graph represent the coal, oil, benzole, and net coke *plus* breeze relationships of the following equation:

$$K = 0{\cdot}564\ C - 0{\cdot}008\ G + 0{\cdot}0119\ bC,$$

which has been derived in the following way:

The yield of net coke, including breeze, for sale—*i.e.*, after providing producer fuel and coke for use in the carburetted water gas generators—can be evaluated from an equation

$$K = Y\,C - Y_1G + Y_2B$$

where K = tons of net coke, including breeze, for sale per 5,000 therms of town gas.
Y = tons of coke *plus* breeze per ton of coal after providing producer fuel, and the coke to manufacture the blue water gas necessary to dilute the straight coal gas to the calorific value of the town gas.
Y_1 = tons of coke used per gall. of gas oil to manufacture carburetted water gas of the same calorific value as the town gas.
Y_2 = tons of coke which would be used to make the blue water gas necessary to dilute a gall. of benzole as vapour to the calorific value of the town gas.

The values of Y, Y_1, and Y_2 depend upon the efficiency of blue water gas production and upon E_1, E_2, and E_3, the enrichment values described in connection with the coal-oil relationships—*e.g.*, if V is the volume of oil gas per gallon of oil, then

$$\frac{V\,(H_{oil} - H_{town\ gas})}{H_{town\ gas} - 318}$$

is the volume of blue water gas required, where H refers to inert-free calorific values. Therefore

$$318\left(\frac{E_2}{H - 318} - V\right)$$

represents the therms of blue water gas required per gallon of oil. If T represents the therms of blue water gas per ton of coke, then

$$\frac{318}{T}\left(\frac{E_2}{H - 318} - V\right)$$

represents the tons of coke needed per gallon of oil, and this term is clearly Y_1.

From the equations or graphs, the following conclusions can be drawn:

Each gallon of gas oil used reduces the amount of coal required by 70 lbs., and reduces the amount of coke *plus* breeze for sale by 58 lbs.

Each gallon of benzole extracted increases the amount of coal required by 90 lbs., and increases the amount of coke *plus* breeze for sale by 76 lbs.

So far, gas of an inert content of 11·2% has been considered. Additional inerts will cause a change in the raw materials required and the products made, and can be replaced by carbonizing more coal or by carburetting more oil. The effect of these separate changes or any combination of them upon the coke for sale can be studied by developing new equations with a new figure for the inerts, on the lines already indicated.

The use of such equations should be of help in formulating policies with regard to the method of making a given output of gas, when confronted by some change in the costs of raw materials or in the demand for the products.

Summary.

The gas-making results from different types of carbonizing plant using Durham run-of-mine coal (8% ash *plus* moisture) are reviewed in the light of an index, termed the "hydrocarbon enrichment value," and represented by "E."

In the absence of coal gas leakage out of the retorts the value of E is an index of the cracking conditions within the retort. An increase in the value of E, with no change in the conditions of leakage, means an approach to the optimum conditions of cracking.

Recent results given in respect of intermittent carbonization—*i.e.*, horizontal retorts, intermittent vertical retorts, and coke ovens—show values of E ranging between 33 and 37·5.

Corresponding results for continuous vertical retorts are lower at 32 to 33. The lowest tar yield of any in the large-scale tests was obtained from a vertical retort installation, which also gave the lowest value of E.

Variations in the quantities of coal and gas oil used, and of net coke produced per unit of gas sold, are shown on a chart based on hydrocarbon enrichment values. The necessary adjustments in respect of benzole recovery are also indicated.

The author wishes to thank the Directors of the Gas Light and Coke Company for permission to publish this paper, and the many engineers and chemists, without whose observations it could not have been written. He is particularly indebted to Mr. H. Hollings for helpful advice throughout.

* Since the delivery of this lecture the author's attention has been drawn to a recent booklet on the "Solid Products of the Carbonization of Coal," published by the South Metropolitan Gas Company. It includes a description of a similar method of determining the volatile therms in coke.

† *Cf.* H. Hollings and S. Hay.[18]

APPENDIX I.

Derivation of Equation I.

Considering the combustible part of gas as a mixture of hydrocarbons and a gas having a calorific value of 318 B.Th.U. per c.ft., the distribution of therms in the mixture is, then

$$\frac{VH}{100{,}000} = \frac{vh}{100{,}000} + \left[V - v - \frac{VN}{100}\right]\frac{318}{100{,}000}$$

Thermal yield of gas per ton of coal. | Thermal yield of hydrocarbons per ton of coal. | Thermal yield of gas of calorific value, 318 B.Th.U. per c.ft. per ton of coal.

Where V is the volume of gas per ton of coal.
H is the calorific value of the gas.
v is the volume yield of hydrocarbons per ton of coal.
h is the calorific value of the hydrocarbons.
N is the percentage inert content of the gas.

The above equation can be rewritten, introducing the hydrogen enrichment value and rearranged as follows:

$$\frac{v(h-318)}{100{,}000} = \frac{V(H-318)}{100{,}000} + \frac{V}{100{,}000}\cdot\frac{N}{100}\cdot 318$$

Hydrocarbon enrichment value. | Enrichment value of mixture. | Enrichment value absorbed by inerts.

This equation is also expressed graphically in fig. 8 in which $v\ (h - 318)$ is shaded downwards from right to left, whilst the area equal to this $V\ (H - 318) + \frac{VN}{100}\ 318$ is shaded in the reverse way.

The last equation can with advantage be rewritten in the form:

$$E = \frac{v(h-318)}{100{,}000} = \frac{V}{100{,}000}\left[H - 318\left(1 - \frac{N}{100}\right)\right]$$

for this is the easiest form to use when calculating hydrocarbon enrichment values, and has been previously quoted as Equation 1.

If this is multiplied by

$$\frac{H}{H - 318\left(1 - \frac{N}{100}\right)}$$

there is obtained Equation 2,

$$\frac{VH}{100{,}000} = \frac{HE}{H - 318\left(1 - \frac{N}{100}\right)}$$

which conveniently correlates thermal yield per ton of coal with the hydrocarbon enrichment value.

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Standardization and Quality Control

Written Contributions to the Discussion

We have received the following written contributions to the discussion on Mr. S. F. Dunkley's Paper on "Standardization and Quality Control," read before the London and Southern District Junior Gas Association on Jan. 25 (published in the last two issues of the "JOURNAL"):

Mr. W. G. RIDGE, B.Sc., of the National Physical Laboratory, writes: There are two points bearing on the subject of Mr. Dunkley's very interesting paper which I should like to emphasize.

Mr. Dunkley has referred in his paper to the necessity of quality control by suitable inspection of the manufactured article. At the National Physical Laboratory we have seen many examples of the benefit of such inspection. As a direct result of the submission of articles for test to some standard specification, we have been able not only to detect the errors present, but to suggest methods for their elimination, and, finally, have shared with the maker the pleasure of seeing considerable improvement in the quality of the article. This has happened, for example, with such things as screw gauges, British made micrometers, penetrometer needles, British volumetric glassware, clinical thermometers, measuring machines, &c., these being only a few of those cases in which the value of amicable co-operation between manufacturer and testing authority has been demonstrated.

In the second place, I should like to emphasize the need for frequent revision of specifications that have been laid down, in order that these may be in accord with current demands. A commendable example of this is afforded by the practice of the American Petroleum Institute, who review their specifications for oil well equipment every six months. In this way agreed modifications found to be necessary either by manufacturer, user, or testing authority are incorporated, with the result that the ideal specification is eventually, and fairly rapidly, attained.

A Vade Mecum.

Mr. H. P. HISCOTT (Le Bas Tube Company, Ltd.) writes: As a member of a Technical Committee of the British Standards Institution, I have been considerably interested in Section 1 of the paper on "Standardization and Quality Control" by Mr. Dunkley. It is to be sincerely hoped that this paper will be issued by the British Standards Institution as a *vade mecum* for everyone interested in standardization, not only for the instruction of and instillation of the correct atmosphere among all members of the 600 Committees now working with the British Standards Institution, but for all manufacturers and users alike.

The great thing that appeals to one is not only the extremely broad view taken of this important work, but the careful detail with which all the relative points have been presented. Nothing but benefit to our industry can come of this co-operation, and I feel that it will be a great day for users, consulting engineers, and architects when they are able to devote the whole of their time to constructive design and execution and leave the specification of all materials required "to be in accordance with the appropriate British Standard Specification." The thanks of industry are due to Mr. Dunkley not only for his work on many British Standards Committees, but for the great amount of detailed work he must have carried out in the preparation of this Paper.

The Vapour Tension of Motor Fuels

J. Verdier and L. Hurel, in *Journal des Usines à Gaz*, **1935, 59, 35-41 (Jan. 20)**, discuss the volatility of petrol, blends of petrol with alcohol and with benzole, and ternary blends containing petrol, benzole, and alcohol.

Investigations were carried out at 0° C. and at 16° C., and, in each case, the vapour tension of the fuel was determined over a wide range of fuel-air ratios—namely, from 0·1 to 100 c.c. of fuel per litre of air. The range of prime interest from the point of view of the carburettor of an engine lies between 0·1 and 1·0 c.c. of fuel per litre of air. The apparatus employed is described.

In the investigation some important facts were brought to light. Whereas, at high fuel concentrations, the vapour tension of touring petrol exceeds that of any of the blends, at low concentrations the vapour tension of alcohol-petrol blends, of benzole-petrol blends, and, still more so, of alcohol-benzole-petrol blends exceed that of petrol. In so far as a high vapour tension may be a factor of importance in connection with the ease of starting-up an engine from cold, the results of the investigation point to advantages which blends, and especially ternary blends, may offer in comparison with petrol.

Further investigations dealing with the inflammability limits and the latent heat of evaporation of the fuels are to be carried out.

The Developments of Distribution in America

by H. W. BATTIN

The following extract from a Report to the Technical Section of the A.G.A., by Mr. H. W. Battin, of the United Gas Improvement Company, Philadelphia, reviews recent progress made in distribution practice in the United States of America.

Compressors are playing an ever-increasing part in distribution work and many companies have compressors mounted on emergency, service, or main trucks. Several companies have installed compressor units on trucks and have driven them with the truck motor by means of a power take-off.

Considerable savings have been made by the use of compressed air, and engineers should consider whether still further savings can be made by an increase in the number of operations where compressed air can be used to advantage.

Pneumatic pipe scalers are used to clean pipe when a connection is to be made in an old main. One company uses, for this purpose, a scaling tool made of beryllium copper, which is hard but non-sparking. Rotary wire brushes operated by compressed air are used to clean the inside of bells and the outside of spigots before laying mains and for other cleaning operations.

Compressed air is used in gas masks. In one company this is accomplished by having the air flow through activated charcoal to remove the oil vapours. Very satisfactory results are obtained.

Round nose gouges are used instead of diamond points by at least one company. These round nose gouges, made of Cesco steel and tempered to a hardness of 58 to 60 Rockwell, last about ten times as long as diamond points. Then, of course, compressed air is used for paving breakers, tampers, caulking hammers, and other purposes.

For all these various uses the tools should be made of the best suited material for the service required, and it is of the utmost importance that each class of tool be properly tempered. A study of this matter may result in considerable saving in tool replacement and maintenance expense.

One company has developed a set of tools which permits them to replace an old service with a new one by making a cut only 1 ft. square through the paving over the main. The new service is attached to the old service in the cellar, and as the new service is driven through the ground the old service is removed at the opening over the main. This naturally has resulted in a considerable saving.

Another company has developed a method of replacing an old service. An excavation approximately 4 ft. long and 3 ft. wide is made at the main. The new service is attached to the end of the old service, and as the old service is pulled out the new one is pulled into place in the same hole. A hoist is used to do the pulling. This method has resulted in a saving in cost of replacement of services.

Use of Stethoscopes.

Stethoscopes have been used by several companies to locate leaks in mains and services. The results have been very gratifying, particularly for locating leaking services, and the companies using them report considerable saving as compared with other methods of searching for leaks.

When it has been determined that a service is leaking, the exact location of the leak can be readily determined by the use of a specially designed expansion plug which is on the market.

Traps in services can be located by inserting a ¼-in. pipe into the service from the house and observing its position when gas begins or stops blowing through the pipe.

The use of comparatively simple tools or devices has resulted in considerable savings for the companies employing them.

The question of gas stealing has been a problem in many companies. As a result numerous devices have been produced with the idea of reducing or eliminating this trouble. Several companies believe most of the stealing occurs in buildings where there are dead services. These companies are now using a specially designed plug to stop off dead low-pressure services, and apparently the desired results are being obtained.

Servicing of appliances is becoming more important every day due to the increase in the number of automatic appliances in use, and the ever-increasing competition with electricity and other fuels. To hold or increase our business we must satisfy our customers. That means that for a reasonable cost to the customer we must give him first-class service at all times.

In several companies a " turn-on " order means putting all appliances in proper operation, including adjusting thermostats and checking safety pilots. This requires a call back on refrigerators and water heaters.

Automatic Ignition.

There has been an increase in the use of automatic ignition on ranges, for both top and oven burners. Automatic dampers are used to increase the efficiency of house-heating jobs. Vacuum and pressure-cleaning devices are used to clean old boilers and furnaces preparatory to installing conversion burners, and also for cleaning existing conversion burner jobs and gas designed boilers during the summer inspection.

The use of the air-cooled refrigerator has reduced the servicing difficulties that many companies experienced with refrigerators. This type of refrigerator requires fewer service calls and is cheaper to service than the water-cooled refrigerator.

Several companies had serious service troubles due to the formation of gums in the small ports of burners and pilots. In cases where repeat calls were required, the troubles were eliminated by the use of non-stop pilots.

Another important phase of our work is metering. Since our revenue is based upon the readings of meters, it is naturally important to have them register accurately for reasonably long periods of time.

The present problems of gas measurement are vastly different from those of the past. These changes are due to changes in gas conditions and changes in load factors, or in the types of loads that have been acquired.

In general, a drier gas is distributed in most communities than was formerly the case. Before this change, various condensates from the gas deposited in the meters and offered a form of protective coating to the interior of the meters. Since the disappearance of this condition, the importance of better continuity of tin plating has increased, and this matter is receiving the attention of meter manufacturers. Also the adoption of the semi-chrome tanned leather diaphragms, and the study of diaphragm dressings have been brought about largely because of changes in gas conditions.

Our present types of business have resulted in unusual load conditions on the meter. For instance, in situations where house-heating customers receive all of their gas requirements through one meter, the load may vary from a rate of 1 or less than 1 c.ft. per hour in the summer up to over 500 c.ft. per hour in the winter. Thus it is important that large-capacity meters continue to meter gas accurately at very small rates of flow.

I have estimated that about 20% of the consumption of a customer having a gas range, refrigerator, and low-demand automatic water heater is metered at a rate of 5 c.ft. per hour or less. Unless meters remain correct at low rates of flow, we may suffer an appreciable loss in revenue.

One company has made extensive prover tests of meters removed from service at a rate of ¼ c.ft. per hour and compared these tests with the check tests. These tests indicate that the company is losing about 7% of the revenue from pilots using gas at that rate, due to slow meter registration. Tests in another company at rates of 4 c.ft. per hour indicate a slow tendency for meters that are correct on the check and open tests.

It is reported that other companies have also found that meters testing correct at check and open flow rates have a tendency to run slow at rates of 6 c.ft. per hour or less.

The records of tests of thousands of meters of various ages in several companies show a definite decline in

accuracy as the meters increase in age. A study of this matter by each company may indicate that a more liberal basis of condemnation of old meters should be adopted as a means toward greater economy.

A close second in importance to meter accuracy is freedom from mechanical trouble. Every interruption of supply which occurs in a meter, and every leak, is a bit of poor gas service which present-day conditions warn us to avoid. Progress in this direction will pay dividends in better customer relations and decreased operating expense.

Many devices have been developed for the purpose of keeping the meters in good condition for a longer period of time, in order that they may give good service as economically as possible.

A tube stiffener plate has been produced to prevent leaks due to strains at old-style short shank sweated meter screws. One company drills the flag rods of old meters and inserts a pin which is bent and soldered to the flag arm. This eliminates troubles due to flag arms breaking loose from flag rods in meters where the ordinary construction at that point is weak.

A flexible non-hardening index box glazing material has been produced and is now used extensively by gas companies and meter manufacturers.

A suggested improvement in meter design is to have a dial box set into instead of projecting out from the case. Another suggestion is to have the internal parts of meters so designed that in service they cannot break, loosen, or distort, with a final check on the competence of the designer made by holding a valve and applying to the inlet a pressure safely above the service pressure. Both of these suggestions are receiving the attention of manufacturers.

It is likely that better standardization of meter design would result in economy of production with an eventual saving to operating companies. Such standardization does not now exist due to minor changes in specifications made by various companies to meet local preference or long-established practices.

Gas Light and Coke Company

Ordinary General Meeting

The Two Hundred and Twenty-Eighth Ordinary General Meeting of the proprietors of the Gas Light and Coke Company was held on Friday, Feb. 8, at the Chief Office of the Company, Horseferry Road, Westminster, S.W.—Sir DAVID MILNE-WATSON, LL.D., D.L. (the Governor), presiding.

The SECRETARY (Mr. W. L. Galbraith) read the notice convening the meeting, and the Corporate Seal of the Company was affixed to the Register of holders of capital stocks.

The GOVERNOR said: Ladies and gentlemen,—Once again I rise to give an account of the operations of the Company in the past twelve months, and I assume that you will follow your usual custom of taking the report and accounts as read.

We finished the year under review just on the right side with our sales of gas, and we may legitimately congratulate ourselves on this result, for we had to contend with weather conditions without precedent since official records have been kept. We started December with a 3% increase in sales over the previous year. December, 1933, was, according to the official records kept at Kew, the coldest since 1890. It was, therefore, reasonable to anticipate that December, 1934, would be less severe, and that there would be some consequent reduction in gas sales. In fact, by one of those freaks for which English weather is famous, we actually had in 1934 the warmest December known for all time to the Kew records. I think you will agree that to have sold more gas in the year 1934 than in 1933 in the face of such weather conditions is a result of which we may be proud. [Applause.]

When we consider this result in the light of our sales of appliances, we have equal grounds for encouragement. Demand for new gas appliances in 1934 has broken all previous records. We have supplied more new cookers, more new fires, and more new water heaters than ever before in our history. We actually issued 280,000 cookers in the year under review. [Applause.] A hopeful and novel new avenue for domestic gas consumption is rapidly being opened up in refrigeration, so we may say that, on the domestic side, we are better placed than ever to meet both extremes of temperature to the satisfaction of our consumers. I shall have more to say in a moment about the significance of this great public quickening of interest in modern domestic gas appliances.

More Gas in Factories.

I want at this stage to complete my general outline of the Company's activities in 1934 by referring to our sales of industrial gas appliances. They, no less than domestic sales, were, you will be glad to hear, in advance of all previous years. This is partly due to factory development in our area and to the many signs of reviving industrial activity, which, happily, are to be noted, and, partly, we may fairly claim, to our own efforts. We spare no pains to see that suitable apparatus is devised for applying gas heat to every industrial process. Gas is now established as the indispensable means of solving industrial problems of heat treatment, and we may look to industry as an expanding market for the Company in future years.

The accounts for the year are, I am pleased to say, satisfactory, and I propose now to deal with a few of the more important details. If you will take the capital account first you will find that we have expended on lands and buildings £30,000; £296,000 on mains and service pipes; £151,000 on meters and £183,000 on stoves; and we have written off by way of depreciation on steamships, meters, and stoves the sum of £248,000, making a net capital expenditure for the year of £412,000.

New Demands and New Designs.

The expenditure on mains and service pipes, meters, cookers, and fires is heavy and must continue to be so for two reasons: first, the opening up in our territory of a large number of new building estates to which gas is being laid on, and, second, to the demand for new cookers and fires to replace old-fashioned appliances. As I remarked at another meeting connected with the Industry, we are living in an "enamel" age, and people will not put up with black cookers and old-fashioned fires any longer. The demand is for a brighter and cleaner note in the kitchen, living room, and bedroom. Fortunately, we are able to meet that demand. Those of you who have seen the new fires in our showrooms and elsewhere will, I am sure, join with me in congratulating our designers and manufacturers on the really beautiful results they have achieved—this is our contribution to the ideal of art in industry, and we are proud of it. Fires can be obtained by customers in any variety of colours that may be desired to fit the *décor* of the house, and not only fires—the enamel cooker is really quite a decorative object in the kitchen. All this, however, means a great outlay by the Company, but it is money well invested.

Turning to the revenue account, you will see that expenditure on coal is somewhat greater. That is entirely due to the larger quantity of coal carbonized, the amount for the year—namely, 3,011,000 tons—being the largest quantity used in any year in the history of the Company. Expenditure on oil shows a decrease; that is due to a reduction in the amount of oil gas which has been made.

Repair and maintenance of works and plant shows a slight decrease, and this is due to the fact that our plant is modern and does not require so much to be spent on it to keep it in order. I can assure you that all our works and workshops are in first-class condition. [Applause.]

Under the heading of "Distribution of Gas" you will see that there has been an increase in expenditure. This is entirely due to greater activity with regard to the selling of gas. I am glad to say that we are being successful in our selling policy, and, as I have already said, the reward has been that in a year which was exceptionally mild we have been able to hold our own in gas consumption and to make unprecedented sales of appliances.

More Heat for Less Gas.

There is an important point in connection with these new appliances upon which emphasis should, I think, be laid. Research carried on at Watson House and elsewhere has led to considerable improvements in the efficiency of gas cookers, fires, and water heaters. They give more heat for less gas. This naturally affects our gas consumptions, but I am sure no one in this room will dispute that our right policy should be to take the maximum advantage of all inventions and technical improvements. This is an insurance for the future and also an encouragement to our consumers to extend the use of gas in their homes.

I do not think there are any other items on the debit side of the account that call for special comment.

Coming now to the credit side, you will see that the revenue from gas is down by some £80,000. This is partly due to the lower price now being charged in the Brentford area (as under our Act of 1925 we had to reduce the price of gas from the beginning of 1934 to the same price as in our own old area), and partly to a lower average price being obtained from large industrial consumers who have taken advantage of our block-rate system.

Record Coke Sales.

Coke and breeze are very satisfactory, the revenue having gone up by some £180,000. This is due to the larger quantities made and also to an improvement in price. We sold 1,283,121 tons—another record in the Company's history. [Applause.] I would also like to point out that an appreciable proportion of our revenue is derived from our liquid bye-products, especially tar and benzole. In this connection, it is not generally realized how important these are from the point of view of employing

home-produced articles in place of those which have to be imported.

Non-Skid Road Tar.

A very large proportion of the tar produced by the Company is used for the maintenance and treatment of roads. It is generally admitted that roads treated with tar provide a surface which is non-skid. In view of the endeavours now being made to reduce the enormous number of accidents which take place on the roads to-day, I am of the opinion that the provision of a non-skid road is of the utmost importance. It is not sufficiently appreciated that a home-produced material in the form of tar, which has been proved to give such non-skid surface, is available in all parts of the country. Realizing the importance of manufacturing a quality of tar which will give the very best results, this Company maintains its own special research department, where investigations are conducted into all problems connected with the production and use of road tar.

I do not think there are any other figures on the revenue account calling for comment.

The result of the working of the year is as follows:

The balance transferred from the revenue account to the profit and loss account is £2,026,000, as against £1,978,000 for the previous year. This balance, after adding the sum of £24,900 received from H.M. Treasury under the Development Act, 1929, and after allowing for interest on borrowed money for the year and dividends distributed in respect of June half-year, leaves a sum of £879,000 with which to pay dividends for the December half-year.

This sum enables the Directors to recommend the usual dividends on the 4% Consolidated Preference Stock, the 3½% Maximum Stock, and a dividend (unchanged) at the rate of £5 12s.% per annum on the Ordinary Stock. [Applause.]

The payment of these dividends, together with the necessary contribution of £20,000 to the Redemption Fund in respect of the half-year ended December, will absorb £696,000, leaving £183,000 to be carried forward to the credit of the current year's accounts, as against £186,000 carried forward on the last occasion.

Since we last met, the Gas Undertakings Act, 1934, has been put upon the Statute Book. This Act, while not giving us the same amount of freedom with regard to charging as the electrical industry enjoys, has undoubtedly given us some measure of freedom which we are going to do our best to use to the advantage of the consumers and the Company.

Successes in Public Lighting.

While on this subject I would mention that we have had considerable success in obtaining public lighting contracts for varying periods with a large number of local authorities. It is generally recognized by the unprejudiced that gas for public lighting cannot be excelled by any other form of lighting. [Applause.]

British Gas Federation.

During the year the Industry formed the British Gas Federation, composed of the National Gas Council, the British Commercial Gas Association, the Institution of Gas Engineers, the Society of British Gas Industries, and the Gas Companies' Protection Association. This combination should prove in years to come a great advantage to the Industry, inasmuch as it is hoped that it will, without interfering with the individual activities of the bodies of which it is composed, unite them together to secure a common policy for furthering and defending the interests of the Industry. We have been honoured by a very distinguished man, Lord Macmillan, accepting the office of first President, and the Federation celebrated its inauguration at a dinner which was held in London on Nov. 5 and which was attended not only by eminent politicians but also by a large number of civil servants and men well known in public and civil life.

With regard to the domestic side of the Company's activities, I am sure you will be much interested to know that in December we celebrated the twenty-fifth anniversary of Co-partnership in the Company. We had a large and representative gathering of co-partners, and Lord Cecil very kindly attended the reunion and made an interesting speech. There is no doubt that Co-partnership ensures a very helpful spirit in the Company, a spirit which will, we believe, be very useful in assisting us to fight our battles in the future. I am hoping the day will come when more industries will adopt this principle, because I am certain that they will never regret it. ["Hear, hear."]

With regard to our offices and showrooms, we have entirely remodelled our showrooms here at Westminster and I hope you will not leave this building without paying them a visit and seeing all the wonderful apparatus and appliances that are on view. We have also remodelled Church Street, Kensington, and brought it thoroughly up to date. We have opened new showrooms in Sloane Street, Battersea, Chingford, and Barkingside, and new showrooms are in course of building at Canvey Island, Kingsbury, Pinner, Ruislip, and South Harrow.

Invitation to all Consumers.

While dealing with this subject, I should like to extend my invitation beyond the shareholders to the consumers generally. We recognize that in a long-established Company like ours it is bound to be the case that the apparatus in the possession of many consumers is not up-to-date, and I should like to address a word to them. It is our earnest desire to replace these old appliances with modern appliances at the earliest possible moment. We have made arrangements whereby this can be easily done at a very small cost to the consumer, and we sincerely hope that all our consumers who have old appliances will avail themselves of our offers. We have done our best to increase the number of our showrooms and have one in practically each district. We have no less than 57 of them, and in addition we have seven travelling motor showrooms which tour our outlying districts. In addition to this, we have already made arrangements with some 200 stores and shops to show our appliances. You will see that we are taking very active steps to bring our modern appliances before the public.

Let me mention some of the modern applications of gas which are still unknown or not so well known as they ought to be—water-heaters, refrigerators, drying cupboards, wash-boilers, irons, &c., not to speak of portable fires and fires that can be lit by switches, doing away with the use of matches, and cokefies that can be lit by gas, thus doing away with the use of paper and firewood, and being clean and easy to manage.

We cannot possibly open a showroom in every street; we are doing everything we can, but I should like to take this opportunity to make a special appeal to the consumers to visit our showrooms and see what we can do for them. While making this appeal to the consumers I should also like to make a special appeal to the shareholders, who must of necessity have the interests of the Company at heart, to use all their influence in their own and their friends' homes and businesses to see that they are well furnished with gas, a task in which the Company's officials will be only too glad to assist them.

Industrial Progress.

As I told you last year, we have established a great industrial centre at Watson House dealing with the supply of gas to industry. We have some seventy-five outside companies who are affiliated to Watson House and we have this year scored some most notable successes in supplying gas for the various requirements of industry in close co-operation with the manufacturers of gas appliances. We can design and supply plant of infinite variety to meet the individual requirements of industries, all of which have their special needs. When heat is wanted, we can supply it better than anyone else. "Do it by Gas" is our motto, and when we have said that we mean it can be done cleanly, efficiently, and cheaply. [Applause.]

Holding Companies.

Since I last addressed you, a great deal of attention has been called to the holding companies formed in the Gas Industry. As this Company was the protagonist in the movement, I think it might be of interest to the shareholders if I gave my views with regard to this new development. The holding company in which we are interested—namely, the South-Eastern Gas Corporation, Ltd., has now under its administration fifteen companies in the South-East of England, and I can say without hesitation that the operation of this holding company has been a distinct advantage to all concerned. The consumers have certainly no reason to be other than pleased with what has happened since we took over control, as in no less than eight cases we have been able to make a reduction in the price of gas in some shape or form. [Applause.]

Criticisms have been frequently made that a holding company must of necessity be controlled by financiers, and must, therefore, have as its sole object financial success at the expense possibly of the needs of the community. If this were proved to be the case, I for one would be very strongly opposed to holding companies, but as the South-Eastern Gas Corporation has shown, this is in no way necessary, and holding companies can be as "gas-minded" as any gas undertaking, company, or corporation. Each case must be judged on its merits, but if it is found, and I think, speaking generally, it will be, that holding companies are anxious to serve the public well and faithfully, there is a very great deal to be said in their favour.

There are two methods of rationalization as far as our Industry is concerned—that is to say, by amalgamation or through the medium of holding companies. The advantages of the first method are well known as is seen in the case of the Gas Light and Coke Company, which is composed of a large number of undertakings joined together in one geographical whole.

South-Eastern Gas Corporation.

Amalgamation would not, however, be necessarily suitable for scattered country undertakings. In their case the better method is that of holding companies, such as the South-Eastern Gas Corporation. The advantage to be derived from control by a holding company is due partly to the fact that raw materials, stores, &c., of all kinds can be bought more cheaply than by undertakings acting individually and also partly to the unification of management which enables the best features of industrial administration and research to be applied to the whole.

Further Issue of Debenture Stock.

No doubt most of you have seen the result of our issue a week ago of a further £2,500,000 of our 3% Consolidated Debenture Stock. The issue coincided, as it happened, with a period of marked financial stress, but nevertheless was completely successful, and was made upon very favourable terms to the Company. The rate of interest to which the Company will be committed in respect of the actual money received will be only a trifle over 3¼%. It may be asked why the Company found it necessary to raise further capital to the extent of 2½ millions, and the answer will, I think, be found in the balance-sheet of the accounts. It will be seen there that we have overspent our capital by nearly £1,000,000; and also that far more money

has had to be provided for appliances purchased by our consumers on deferred payment terms. The practice of purchasing and deferring payment in this way is becoming more and more popular, and it is anticipated that even larger sums will have to be found by the Company in the future to finance this phase of our business.

For some few years also, as I have already indicated, expenditure will be incurred in laying additional mains in outlying districts where housing estates and factories are continually being erected and money will be required to purchase enamel cookers in large quantities to take the place of the old-fashioned black cookers that are now entirely out of date.

The further capital we shall now receive will enable the Company to meet this expenditure without unduly calling upon the bankers for assistance.

There is just one matter with regard to the personnel of the Company to which I should like to refer—namely, that Mr. H. E. Ibbs, who has been Chief Accountant for 20 years, is going to retire at the end of March. Mr. Ibbs has spent all his business life with the Gas Light and Coke Company, and has rendered most valuable service. I am glad to say, however, that he is not leaving the Company altogether, as we have appointed him Consultant Accountant. [Applause.]

In conclusion, I should like to say that the employees of all grades have worked with great energy in the interests of the Company.

The GOVERNOR, having then invited questions or comments, and there being none, moved:

> That this Meeting do agree with and confirm the Report of the Directors and the Auditors' Report and Statement of the Accounts of the Company for the year ending Dec. 31, 1934.

The DEPUTY-GOVERNOR (Mr. Henry Woodall, M.Inst.C.E.) formally seconded the resolution, and it was carried unanimously.

Dividends.

The GOVERNOR then called upon the Secretary to read the Minute of the Court of Directors recommending dividends for the past half-year.

The SECRETARY read the Directors' minute dated Jan. 25, 1935, as follows:

> RESOLVED.—That it be recommended to the Ordinary General Meeting of Proprietors to be held on the 8th proximo that (1) dividends as follow for the half-year ending the 31st December, 1934, be declared, viz.:
>
> | | £ s. d. | |
> |---|---|---|
> | On the 4% Preference Stock at the rate of ... ... | 4 0 0 | per cent. per annum. |
> | On the 3½% Maximum Stock at the rate of ... ... | 3 10 0 | ,, ,, |
> | On the Ordinary Stock at the rate of ... ... | 5 12 0 | ,, ,, |
>
> All subject to deduction of income-tax.
>
> (2) In accordance with the provisions of Part III. of the Company's Act, 1931, the sum of £20,000 be set aside towards the Redemption Fund.

The GOVERNOR: I beg leave to move the adoption of that recommendation.

The DEPUTY-GOVERNOR seconded the resolution, which was unanimously agreed to.

Re-Election of Directors and Auditors.

The GOVERNOR: Two Directors (The Viscount Mersey and Sir Harold Brewer Hartley) retire by rotation in the ordinary way at this meeting, and offer themselves for re-election. I beg leave to move that the Viscount Mersey be re-elected a Director of the Company.

The DEPUTY-GOVERNOR seconded, and the motion was agreed to.

The GOVERNOR: I beg leave to move that Sir Harold Brewer Hartley be re-elected a Director of the Company.

The DEPUTY-GOVERNOR seconded this, and it was carried.

The Company's Auditors (Messrs. J. A. Stoneham and P. H. Ashworth) were also re-elected, on the proposition of Mr. H. DODIMEAD, seconded by Mr. G. L. VEAL.

Vote of Thanks.

Mr. H. RAYNER: Once again we have heard a speech from our esteemed Governor full of interesting information with regard to the operations of the Company during the past twelve months, and once again it becomes our duty and our pleasure to record a hearty vote of thanks to all who have helped to bring those operations to a successful issue—Directors, staff officers, and employees of all grades, from the General Manager himself down to the latest recruit in the workshops. If we were to search through the lists of all the public companies in the United Kingdom, I venture to say that we should be unable to point to any one the Chairman of which works harder or more successfully for his undertaking, or who is held in higher public esteem, than our Governor, Sir David Milne-Watson. [Applause.] Nor can we point to any company whose Directors enjoy greater confidence on the part of the shareholders than do the Directors of this Company. And, again, we should fail to find any company with a more capable and more loyal body of employees of all descriptions than the Gas Light and Coke Company. ["Hear, hear."] May they be spared to continue their activities for the good of the Company, and to enjoy for themselves the fruits of their labours. In this spirit, I move a resolution of thanks to all of them, and ask the proprietors present to give the vote their hearty support.

Mr. H. L. MANN: I have much pleasure in seconding this vote of thanks, and in associating myself with Mr. Rayner's remarks.

The motion having been carried with acclamation,

The GOVERNOR, in acknowledgment, said: On behalf of myself and my colleagues, and also on behalf of the staff and employees generally, I wish to thank Mr. Rayner for the charming way in which he has proposed this vote. It is always a pleasure to the Board to see him. I also wish to thank you, ladies and gentlemen, for the kind manner in which you have received the vote. It is a great encouragement, at the beginning of a fresh year, to receive such a hearty "send off" as you have given us to-day.

This concluded the proceedings.

South Metropolitan Gas Company

Ordinary General Meeting

The Ordinary General Meeting of the Proprietors of the South Metropolitan Gas Company was held at Southern House, Cannon Street, E.C. 4, on Wednesday, Feb. 6—Dr. CHARLES CARPENTER, M.Inst.C.E., in the Chair

The SECRETARY (Mr. F. G. Brewer) read the advertisement convening the meeting, and the minutes of the last Ordinary General Meeting and Extraordinary General Meeting, after which the Seal of the Company was affixed to the Register of Proprietors.

The PRESIDENT, addressing the meeting, said:

Ladies and Gentlemen,—I could have wished that a better balance-sheet, one of extended instead of diminished business, had inspired the Report I am now asking you, on behalf of my colleagues and myself, to adopt for the year 1934. As a public utility undertaking entrusted for something like a century with duties and obligations towards the community, we have no other course open to us in preparing the annual statement of what we have been doing than to place it before you as a plain, an unvarnished, picture of the year's happenings, of the troubles and pleasures experienced in carrying on a business which demands to-day a greater amount of managerial oversight than, I think I may say, at any period of its history.

Control of the Gas Industry.

I remind you that we are a public utility undertaking, and, as such, we are placed outside what I call the intrigues, whether of commerce or of politics. No Minister of the Crown is empowered with the duty of giving a sympathetic eye to the great Industry of which we form part; no group of Members in either House makes it its business to watch over our interests, and the practical purpose of the formation of the late Lord Haldane's Committee, that encouragement and protection should be given to the process of utilizing coal by its conversion into town's gas, remains unrealized. The business of gas supply is the only one I know of which carries on a large manufacturing and distributing organization, an important branch, in fact, of the Chemical Industry, in which its area of operations is limited and controlled by Parliament under charters from time to time extended or curtailed in regard to the powers they prescribe.

When under various circumstances the social work which we have carried on side by side with that of gas supply has been subjected to the criticism of socialistic critics, they have affirmed that the good fortune our capital has enjoyed *vis-à-vis* labour has been due to our being a sheltered industry, monopolistic in fact, and therefore free from the kind of competition which other industries than our own have to meet. So that when your eye is attracted, as it is bound to be, by the opening sentence in the first paragraph of your Board's Report, I must beg you to bear in mind that we can neither seek nor accept customers for our gas (and to meet their requirements is the sole *raison d'être* for our existence) beyond a definite boundary which Parliament has laid down, and, moreover, that the requirements for centrally supplied light, heat, or power of those who live or work or carry on business in that area are not limitless, but have to be shared between those already engaged in such businesses; so that one's progress may mean another's regress. We have done our best, but unsuccessfully, to maintain our proportionate share at last year's figures; and now as a natural sequence to that result our profit balance is automatically reduced. The standing charges we incurred in the provision of plant and the preparedness of labour have become less completely remunerative, with the result that the balance available for the share-

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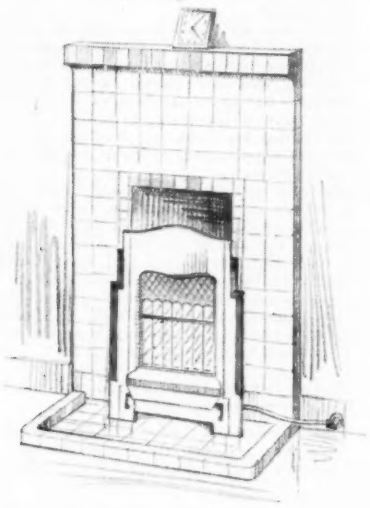

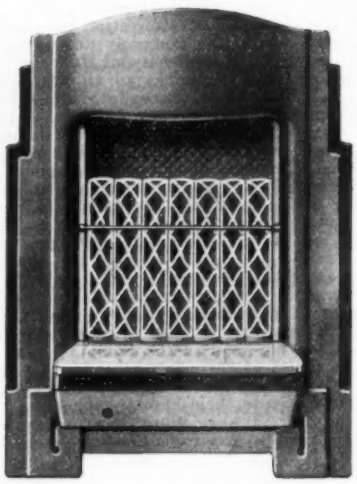

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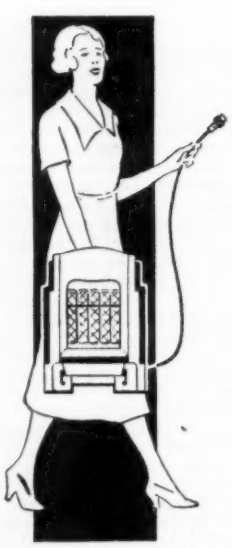

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holders' dividend on the one hand, and the co-partner-employees' bonus on the other, has contracted.

Increased Demands for Appliances.

Various reasons may be assigned for this. At the suggestion of friends, I shall avoid in these remarks any reference to the unfriendly influence of the weather, as I should be trespassing upon the domains of the farmer, who is allowed special privileges in this respect; nor shall I recall the tantrums and capers of "Pretty Fanny," since her misbehaviours during 1934 are as fresh in the public's mind as they must be among her very many influential friends. Of the reasons to which I shall refer, two, and those probably the more important, are the changed attitude of the public towards home-life, and the increased competition from supplies of electric energy. I will deal later on with the manner in which the scales of fair-play have been tipped against us in our endeavour to carry on in an honourable way an honourable business, which certainly has not, in the last five-and-twenty years at any rate, returned large financial profit to those engaged in providing either its capital or its brains. Summed up in the paragraph of the Report to which I have been referring, you have in a nutshell, so to speak, the all-important detail of the past year's results. They are disappointing, and yet trade with us is by no means dull, if the sale or hire-purchase of gas-consuming appliances can be taken as an indication. The public certainly does not acquire such articles for decorative purposes, but for more or less daily use, albeit a more restricted one than formerly. Unfortunately, in one sense, greater demands are thereby made upon our need of capital. But if you should form any impression that such increase does not accord with less favourable business results, it must be borne in mind that capital requirements must necessarily vary with the character of the business to which they pertain, and that they must needs alter with it. You will remember that we had to make a large addition to our capital with the post-war change of values, as we needed more money for working purposes. A great financier laid down the precept that it mattered little how one side of the account was added to so long as on the other there was provided a not less valuable asset, and it is that precept to which we must have some regard in formulating our future plans for capital provision.

High-Power Gas Lamps and Mantles.

The third paragraph of the Report deals with public lighting and the recent extended use of high-power gas lamps in the main thoroughfares of South London. Many years ago the importance was brought home to us of the great development of the light-giving qualities of coal gas by the association therewith of the Welsbach rare-earth filament, and we determined upon, and carried out, a proposal by which a considerable stock of the special chemicals required to produce these filaments was stored for emergency use. One such emergency arose, I may remind you, during the Great War, since when the stocks upon which we then drew have been adequately replenished. But we realized that something more than possession of the materials used was wanted if we were to obtain complete immunity from irregularities of supply or quality in what are popularly known as incandescent mantles—namely, a complete knowledge of the technique of their manufacture. We therefore set up a small-scale plant capable of producing only a fraction of our requirements, but large enough to provide operative practice in which our chemical and physical staff might learn the secrets of filament production. In this we have succeeded; we can now make mantles the qualities of which are unexcelled.

An Epoch-Making Invention.

But we recently have accomplished much more. We have developed an epoch-making invention, an immense advance in the production of high-power filament light, and one pre-eminently suited for street lighting, by the design of a lamp we have called the "Supervia." And whereas the latest type of mercury vapour lamp destroys all colour in whatever it illuminates, and gives a ghastly ghostly hue to the complexions of man and woman alike, the new gas lamp more effectually than ever develops a quality which is not only brilliant and penetrating, but more nearly approximates to that provided by our great natural light source, the sun. In a word, our new lamp floods the night with a sunshine in contrast with the moonshine of its mercurial electrical rival, and if the "Supervia" is impartially judged I have no fear of the result. In order that you may judge for yourselves on this matter, ladies and gentlemen, I have asked our Chemical Laboratory to fix up one of the new lamps in this hall, and, with the lights lowered, you will see what it can do. So far as the gas consumption is concerned, it is a small lamp; the consumption being something like that of two small flat-flame burners. [The lamp having been exhibited, at the back of the Directors' table, the President continued.] I think you will all agree that it is a beautiful light—emanating from a consumption of some 10 c.ft. of gas per hour. One of the difficulties encountered in the matter of public lighting is the fact that no generally-accepted standard exists as regards the amount of illumination needed in the various types of streets which form the thoroughfares of this Metropolis. And for this reason an Interim Report from the Departmental Committee now sitting could not fail to be very useful in enabling those municipal engineers who are properly the authorities responsible for such duties to arrive at a decision as to what is needed in the various boroughs supervised by them. Whether a still further increase in the amount of street illumination will encourage motorists to use greater care or to travel at greater speed, is matter for careful thought.

Coke, Tar, and Ammonia.

Turning now to bye-products, there is not a great deal that is novel to be told you. We are continuing the comparatively recent policy of leaving a definite amount of gas in the coke instead of driving it all out by a process of complete carbonization, and it is found that the loss of gas-yield is more than compensated by the increased value of the coke. As regards "Metro-Coalite," I need say neither more nor less than that it continues a useful adjunct to our business, curiously enough more popular with the less well-to-do than with the wealthier section of the community. As regards tar, the business of its distillation becomes more and more complex, especially in the matter of road tar. We hold in stock for ordinary main road use seven different qualities, and also make up various other kinds to the special specifications of individual highway engineers. A useful addition to our revenue from products has been that from ammonia (for a year or two a drug in the market), and great praise is due to the Manager of our Alkali Works for the admirable way in which he has modified processes he has in use to suit the altered values of to-day.

Freedom of Municipal Tenants.

The section following in the Report refers to legislative matters, and except in one particular I will defer discussing these until we come to the Extraordinary Meeting. The exception refers to the passing of an Act during last Session which affirms that "it is inexpedient that the occupiers of houses erected at a cost which has been defrayed out of public funds should be prevented from obtaining a supply of gas or be restricted as to the purposes for which they may use gas supplied to them, and that the Company should be hampered in carrying out the purposes for which they were incorporated by Parliament and in developing their undertaking in the general interests of the inhabitants in their limits of supply." By this Act Housing Authorities are prohibited from making regulations designed to limit the use of gas supplied within the Company's area. Does it not seem, ladies and gentlemen, a very remarkable thing that there should be placed upon the Statute Book in the year of grace nineteen hundred and thirty-four an Act of the King's Parliament having such purpose? And not by a snap vote of hesitancy of opinion, but as an overwhelming expression of the views of both Houses. I thought, and surely was entitled to think, that no more obstacles would be placed in our way in carrying on unhampered our legitimate business. But I have been in one instance most bitterly disappointed.

I am only asking on your behalf that the intention of Parliament should be implemented when I plead that a municipal tenant who possesses an unhampered use of oil lamps or composite candles in his tenement should be allowed a free use of gas likewise. We offered without any charge to fit up all houses now being constructed under Housing Schemes with pipes built into the structures and furnished with unnoticeable points, in any position the authority's officials might determine, to which such fittings could afterwards be attached as a tenant might require. Whatever may be the underlying cause of the injustice from which we are still suffering, passes my comprehension. Our business is legitimate, our employees are good citizens. What have we done that your business should be so damaged, or they that their employment should be thus curtailed? Have politics so far intruded into municipal affairs that our employees' very contentment with their service becomes thereby a menace? Perhaps you, ladies and gentlemen, can answer a question which for me and my colleagues is an unanswerable one.

The Gas Referees.

Before I conclude, there is one *quasi*-official matter upon which long acquaintance inspires me to say a few words. For well over half-a-century we have carried on this undertaking subject to the control of two Departments of the Board of Trade—financial by its official audit of our entire accounts, and scientific by the authority exercised over gas quality and pressure by the Referees. I had long believed that the powers exercised by these latter gentlemen would be extended rather than curtailed; but those hopes have now been destroyed, for the tenure of their office has been determined. It is more than the fifty years to which I have referred since I came into an official contact with members of that body, and with increase of years my admiration for the manner in which their duties have been carried out has continued to increase. I deeply regret their passing, and your Board has forwarded to the proper quarter an expression of that regret. If the conferment of a knighthood upon Dr. C. V. Boys is to be considered as in any way a mark of recognition of what the gas consumers of the Metropolis owe to the body with which he has been so long and so honourably associated, something will have been done, however small, to soften the feelings of sorrow with which must be regarded the closing-down of the important office for the duties of which he and his colleagues have been so long responsible.

Welfare of the Employees.

Finally, let me draw your attention to the penultimate paragraph of the Report, which makes reference to the welfare of the employees. That they were well disposed to their employers is a matter of common knowledge; they are entitled as a whole

to be reckoned in the first rank of citizen workers. But it must be of not less gratification to you, ladies and gentlemen, that their average health is of the high standard to which the Report bears testimony. Their working lives are spent in an atmosphere of gas manufacture and supply, and in the vast majority of cases they employ gas in their homes. Could such figures, typifying a so thoroughly healthy staff, have been achieved if, on the one hand, the manufacture and supply of town's gas, or, on the other, its use for lighting and heating their homes or cooking their food, were attended with those dire effects, the falsehood of which is so sedulously cultivated by those bent upon its disparagement and so unfairly acted upon by those who are influenced by such propaganda?

Looking Forward.

And now what of the future—a future which, I am convinced, may well fill us with renewed resolution and confidence, provided we are given our rightful place within it? This is an age of what I may call quickened social conscience, a conscience that will not be content to do less than its utmost to improve the lot of those who live in conditions which modern standards can no longer tolerate. One of the two main measures in the present Session of Parliament is designed to produce better housing, and here the Gas Industry has a great duty and a great opportunity. Your Company can already point to much accomplished in this direction. Such examples as Sassoon House have shown what contributions gas can make to the comfort of the poorer as well as the richer members of the community. Light, heat, the means of cooking, and, what is now recognized as a prime need of health, a liberal supply of hot water—all these gas can supply more efficiently and more economically than any other form of fuel. For more than a century the spirit of public service has inspired those who have carried on the business of your Company and those who have provided the means by which they could do so. That same spirit is still alive, and we ask only that we may be granted a fair field to give expression to it. The next few years promise to see many changes in the housing of South London, and we shall do our best to secure that gas shall take its proper place in that development.

I have now to move:

> "That the Report and Accounts now presented be received and adopted, and the Report entered on the Minutes."

In the absence through indisposition of the Vice-President, I will ask Mr. Frank Bush to second the resolution.

Mr. FRANK BUSH formally seconded, and the PRESIDENT thereafter invited comments or criticism.

Mr. J. M. POWER referred to what he said appeared to be contradictory statements in two of the accounts. In the Revenue Account it was stated that the amount received for tar was £153,724, whereas in the Statement of Bye-Products it was shown that the quantity of tar sold during the year was 2,974 gallons. Then, again, with regard to ammonia, the total realized was given in the Revenue Account as £11,680, whereas the Statement of Bye-Products showed the amount sold during the year as *nil*. With reference to what the President had said as to leaving more gas in the coke, he questioned whether this was advisable, as it resulted in more rapid consumption of the coke. At any rate, he found it burned more quickly now than it used to do.

The PRESIDENT, in reply, said the Accounts were in the official form which had been prescribed and used for a great many years, and the statements made were in a sense true, although he agreed that they must appear at first sight somewhat misleading. As the speaker had pointed out, the tar sold during the past year realized £153,724, but, in spite of the fact that the make during the year was close upon 12 million gallons, they had actually sold only 2,974 gallons. The explanation was that the balance had not been sold as tar in the condition in which it came from the retort house, but had been subjected to some form of treatment or distillation, so that it did not come under the heading of "Sold." The same explanation applied to ammoniacal liquor. In days gone by they sold all their ammoniacal liquor as such, without working it up, and so it appeared in that form. In these accounts, they showed that they had not sold any liquor as liquor. In the Statement of Bye-Products the column headed "Used during the Year" gave figures which, in these two cases, were comparable with the quantities "Made during the Year." He was sorry the shareholder now found his coke burned more rapidly, but, if he was using the same apparatus as for the inferior coke previously supplied, the fault might well be with the regulation of the air supply. With better coke, no doubt more careful regulation would be needed. What the Company found as the result of supplying this better coke was that the large majority of consumers were much more satisfied with it than they had been with the quality previously supplied.

Mr. KEIGHLEY said he would like to refer to the manner in which the Board communicated their final dividend to the public. He felt sure that the shareholders were all disappointed and surprised to read that it had been slightly reduced. He fully expected that there would at the same time be a copy of the full report to explain it. The announcement had an important effect in the City; for the stock dropped about 16 points in two or three days. Had the report been available then, the shareholders would have felt that there was no reason to be alarmed. He did suggest, therefore, that, particularly when there was a change such as this, it would be far better to send out the report at the same time as the dividend announcement. Then he would like to ask whether the Company took any part in the publicity propaganda which was now going on to combat the inevitable inroads of electricity. If so, he would be glad to hear it. If they did not, there must be some adequate reason. If they were not participating in the B.C.G.A. campaign, what campaign had they of their own to advance their interests?

The PRESIDENT said he would not like it to be thought that the Directors did not attach importance to the view the Stock Exchange might take of their affairs, because they did, and as soon as ever the figures were made up they felt it was right that they should make the earliest possible intimation of the dividend. This was their duty to all. The report, however, was another matter. In this, they had to give the whole story; and to send out both together would mean the holding back of the dividend intimation until the whole of the results had been thoroughly gone into. These results had to be submitted to the Board of Trade, and such things must take some time. He could not see the possibility of doing anything else in the matter of announcing the dividend than what they were doing at present. Surely the proper thing, as soon as the Board had decided what distribution they were justified in recommending was to let the public know, and, this being so, he could not hold out any hope that a change would be made. With regard to the question of publicity, they had carried on their own campaign for a long time past. He could assure the shareholders that the Directors were not in any shape or form unmindful of the fact that business depended more and more as time went on upon efficient and suitable advertising. For example, he might quote the Exhibition held at the Crystal Palace which provided for the interests of South London perhaps more than any other. This Exhibition was designed and carried on, as far as the gas display was concerned, by their own Company, together with its associate the South Suburban Company. There were a great many other ways, too, in which they carried on such publicity work as was desirable. Whereas the British Commercial Gas Association were dealing with the needs of the whole community, and had to secure subscriptions from the whole of the Industry, the efforts of their own Company were for their own area and to suit their own particular circumstances, and the Directors thought they were spending their money better in this way than in any other. The work done by the B.C.G.A. was, he thought, improving on what had characterized it over a large portion of its earlier history. The Company did subscribe to the Association, but not to the full extent of other undertakings who were in the habit of leaving the whole of their publicity to that Association. The South Metropolitan Company had their own staff of artists, so that they were able to spend their money on their own particular work.

The resolution was then put to the meeting, and carried unanimously.

Dividends.

The PRESIDENT then moved, Mr. F. MCLEOD seconded, and it was agreed:

> "That the following dividends be now declared, viz.:—On the 6 per cent. Preference Stock a dividend of 3 per cent. and on the 4 per cent. Preference Stock a dividend of 2 per cent. for the half-year ended 31st December, 1934; and on the Ordinary Stock a dividend of 3¼ per cent., making, with the interim dividend of 2½ per cent. paid in respect of the first half of the year, a dividend at the rate of 5¾ per cent. per annum for the year ended 31st December, 1934; and that warrants be transmitted to the registered addresses of the Proprietors by post for the amounts of such dividends."

Re-Elections.

On the proposition of the PRESIDENT, seconded by Mr. B. R. GREEN, Mr. Frank Bush and Mr. Arthur M. Paddon were re-elected Directors of the Company; and Mr. John H. Fry was re-appointed an Auditor, on the motion of Mr. PASMORE, seconded by Mr. HEAD.

This concluded the business of the Ordinary General Meeting.

EXTRAORDINARY GENERAL MEETING.

The Company's Bill.

The SECRETARY then read the notice convening an Extraordinary General Meeting, to consider a Bill to extend the Company's limits of supply and for other purposes.

The PRESIDENT then proceeded to explain the main features of the Bill. In doing so, he said it was necessary to take the shareholders back some fifteen years, when they agreed to a proposal of the Board that a new basis of charge should be asked for in relation to the working of the Company. The powers in that connection then granted them by Parliament were limited to five years, at the end of which period they secured an extension of ten years, which would expire in a few week's time. Therefore the Company were now under an obligation to promote another Bill, so as to give the local authorities an opportunity of being heard as to whether the Company's charter, as he might call it, should be continued, modified, or brought to an end. This was an indication of the sort of handicap under which a Company such as theirs suffered in comparison with an ordinary commercial undertaking.

The Company had for many years supplied gas in an area which was formerly part of the parish of Mottingham, in the rural district of Bromley, and was now by virtue of the Kent

Review Order, 1934, part of the urban district of Chislehurst and Sidcup, so that it was not within the limits of supply of the Company. One of the purposes of the Bill was to extend the limits of supply, so as to rectify this. They were also taking advantage of the obligation under which they were of coming to Parliament with a Bill to bring their procedure in certain respects, under their Act of 1920, into line with the Gas Regulation Act of 1920.

Ascertainment of Therms Supplied.

Section 4, the President said, provided alternative methods of ascertaining the number of therms supplied to any consumer of the Company, "(*a*) by multiplying the number of cubic feet of gas registered by the consumer's meter by the number of British thermal units comprised in the declared calorific value and dividing the product by 100,000; or (*b*) by incorporating with the cubic foot index dial of the consumer's meter a train of toothed wheels appropriate to the declared calorific value of the gas by means of which the measured volume of gas passing through the meter is registered in therms and mutiples and fractions thereof."

Exhibiting the mechanism referred to in alternative (*b*), the President remarked that it was very much like that of an ordinary meter, except for the additional dial, and this additional dial was operated by three wheels on two spindles. By this arrangement the indications of the meter, instead of being expressed in cubic feet, were expressed in therms. When one thought of the Industry's work, it was curious to reflect that there was quite an amount of legislation pertaining to the use, testing, &c., of gas meters, which must be stamped to avoid a penalty, whereas in the matter of electric meters there were no obligations at all. This was just an example of the different methods under which gas and electricity operated. There was a clause governing the pressure of gas of less than 350 and 300 B.Th.U.

Constitution of the Board.

Another innovation to which the Directors attached importance was that, without disturbing the ordinary Board, they should, in special circumstances, have the right to co-opt, for a short or long time, someone who might have particular knowledge of matters at the moment under consideration by the Directors. It might be of great value to the Company, and also a reward for services rendered, if they so appointed for a period an officer who had reached retiring time. Again, when the election of Employee Directors was brought into operation in 1896, they were not made additional to the ordinary Directors, and the Bill sought to put this right.

In the Bill as originally drafted, it was suggested that there should be another period of ten years before the Company should be obliged to go Parliament again and afford an opportunity for revision of the basic price provisions. The Board thought this a reasonable period, but to meet the views of the London County Council they had agreed to substitute five years for the ten years suggested. He concluded by moving:

> "That the Bill now submitted, entitled 'A Bill to extend the limits of supply of the South Metropolitan Gas Company; and for other purposes' be, and the same is hereby, approved, subject to such additions, alterations, and variations as Parliament may think fit to make therein and as the Directors may approve."

Mr. HAROLD GUNDRY seconded the motion, which was carried unanimously without discussion.

The PRESIDENT remarked that this concluded the business for which the shareholders had been called together.

A Vote of Thanks.

Colonel E. J. WOOLLEY said it was his privilege and his pleasure to ask the meeting to accord a vote of thanks to the President and Board of Directors for the manner in which they had conducted the affairs of the Company during the past year. There had been difficulties to contend with, but they had met them with courage and foresight, and it must be the wish of the shareholders that acknowledgment should be made of what had been done. Included in the vote must be the employees of the Company. Without the good and loyal staff the Company possessed, the results recorded could never have been achieved. One of the great traditions of the Company was the loyalty of the staff to the Board. He moved:

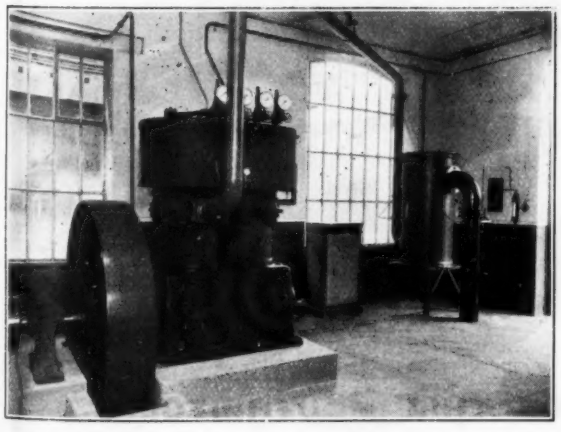
> "That the best thanks of this meeting be accorded to the Directors, officers, and other employees of all ranks for their attention to the interests of the Company."

Sir J. FORTESCUE FLANNERY seconded the resolution, which was carried with applause.

The PRESIDENT, on behalf of himself, his colleagues, and the staff, thanked the shareholders for their warm-hearted vote. Such support and encouragement was deeply appreciated in times which, he was bound to say, were not too easy.

"Bottled Gas" for Motor Vehicles in France

Following the example of the Société du Gaz de Paris, the authorities of the gas-works of Lyons have for some time been devoting attention to the use of compressed gas for the running of industrial motor vehicles. Working in conjunction with the municipal motor 'bus and tramway undertaking, experiments have been in progress with gas-driven motor 'buses, and in view of the increasing demand for gas compressed in cylinders a special compressing station has recently been installed at the Perrache Gas-Works in Lyons, under the direction of M. G. Venot, the Chief Engineer of the Société du Gaz de Lyon.



View of Compressor Room at the Perrache Works of the Compagnie du Gaz de Lyon.

The station is divided into two sections, in one of which is installed an 80 H.P. electric motor running at 1,400 r.p.m. and a reduction gear, together with the necessary starting gear, circuit breaker, and switchboard. The shaft passes through a gas-tight hole in the dividing wall to a Burckhardt vertical compressor, capable of giving an output at normal pressure and at 270 r.p.m. of 7,060 c.ft. per hour. The gas is compressed in four stages to pressures of, respectively, 35, 156½, 654, and 2,844½ lbs. per sq. in. At the end of each compression stage provision is made for cooling; there are also a decanting cylinder with clearing valve, and safety valves. The compression stages are arranged in tandem—viz., 1 and 4 and 2 and 3. The two low-compression cylinders are water jacketed while the two for high pressure are enclosed in a water tank in which are also laid the water cooling coils of the other cylinders.

Gas is supplied to the compressor by an 8-in. pipe, branched off a 24-in. service main in the works, a stop valve being located on the outside wall of the compressor station. Between the stop valve and the compressor is a filter, consisting of a cylinder with a textile sleeve through which all the gas has to pass, so withdrawing any dust it may contain.

From the compressor, the compressed gas passes along a 17 by 25 mm. cold-drawn steel pipe to an external cylinder charging platform with four control valves, two of which are adapted to be connected up to the gas cylinders of two motor vehicles at a time, while two can be connected up for charging two reserve batteries of 10 and 15 cylinders each having a capacity of about 2,930 cub.in. of water, which are kept ready for use. It is stated that eight cylinders on a motor vehicle can be recharged with compressed gas in about ten minutes. Ample provision has been made to guard against any danger of accident. An emergency switch is provided adjacent to the charging platform by means of which the electric motor and consequently the compressor can be immediately put out of action; arrangements are also made so that the latter automatically stops should there be a stoppage in the gas supply or should the pressure exceed a certain value.

Gas Undertakings' Results for 1934

Andover.

The accounts of the Andover Lighting and Power Company for the year ended Dec. 31, 1934, state that the mildness of the past season has not been conducive to a heavy demand for gas, but despite this there has been an increased output. A considerable expenditure has been incurred in the extension of mains and the provision of new meters, stoves, and services, which should lead to a satisfactory increase in sales during the current year. 251 additional consumers were secured during the year. The Company has secured the renewal of the public lighting contract for another term of 5 years, and the Borough Council are considering the provision of a substantial increase in the number of lamps, made necessary by large extension of built-up areas in the Borough. An issue of £15,000 5% preference stock was made in March last, when the amount was readily taken up. A contract has been placed for the erection of a new 350,000 c.ft. gasholder, the work for which is well in hand. The Directors have applied to the Board of Trade for a Special Order to increase the area of supply by taking in various parishes on the western side, including Ludgershall and Tidworth. The balance available for dividends is £3,080, out of which the Directors recommend the following dividends: For the half-year ended Dec. 31, 1934, at the rate of 6% per annum on both the ordinary shares and the £3,000 6% preference stock, and 5% on the £15,000 5% preference stock, less income-tax, payable on March 1, 1935, and for the half-year ending June 30, 1935, at the rate of 6% per annum on both the ordinary shares and the £3,000 6% preference stock, and 5% on the £15,000 5% preference stock, less income tax, payable on Sept. 1, 1935, to shareholders registered in the books of the Company at that date.

Isle of Thanet (Margate).

The Directors' report for the year ended Dec. 31, 1934, states that the sale of gas for the year was 491,165,300 c.ft., or 2,259,360 therms, representing an increase of 3·6% over the previous year. The business of the Company generally has progressed satisfactorily, and the works, plant, and mains have been maintained in an excellent condition. An interim dividend of 4¾% was paid on Sept. 29 last, and the Directors have now recommended a final dividend at the rate of 5% payable on March 25 next. The Board report with regret the death of Mr. G. W. Saxby, J.P., who had filled the office of Statutory Auditor since 1928.

Malton.

The report and the statement of accounts of the Directors of the Malton Gas Company for the half-year ended Dec. 31 state that the balance of profit is £1,923 compared with £1,775, an increase of £148 over the corresponding period twelve months ago. Gas receipts amount to £5,983, against £5,985. This can be considered satisfactory, as the weather was much milder during December than a year ago. The receipts from asphalting are less, but the receipts from coke, tar, and fittings have increased. With the balance of £5,829 brought forward from the last accounts, there is a balance, after paying income-tax, of £7,505. Out of this sum, the Directors recommend the payment of a dividend of 6½%, free of income-tax, for the half-year. This will absorb £1,560, and leave £5,945 to be carried forward to the next accounts.

Pudsey.

The report of the Directors and statement of accounts for the year ended Dec. 31, 1934, state that the sales of gas show a slight decrease when compared with the previous year. The Company adopted the system of supplying gas through prepayment meter on July 1, 1934. The balance of net profit, after deducting the interim dividend at the rate of 9% per annum, paid on Aug. 1 last, amounts to the sum of £13,431, from which the Directors recommend the proprietors to declare a dividend for the past half-year at the rate of 9% per annum.

Reading.

The report of the Directors of the Reading Gas Company for the year ended Dec. 31, 1934, states that the total sales of gas for the year amounted to over 1,399 million c.ft. This figure constitutes a record in the history of the Company, and shows an increase of 27,109,500 c.ft. over the previous year. The revenue from residuals continues to be satisfactory. Since the alterations and improvements to the Company's showrooms were completed, there has been a marked increase in the sale of all gas appliances. During the year 1,103 cookers, 819 fires, and a large number of water heating appliances were sold. The Company's contract for public lighting

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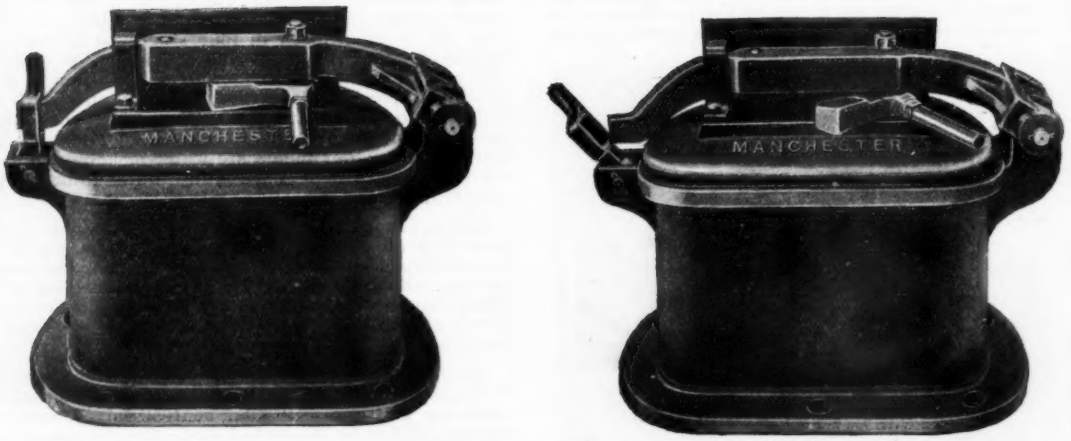

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has been extended until June 30, 1935. £15,000 5% redeemable debenture stock was redeemed on Oct. 1, 1934. Interim dividends at the statutory rates for the six months ended June 30, 1934, were paid on Sept. 1, 1934, and the Directors now recommend that dividends at similar rates for the half-year ended Dec. 31, 1934, be paid on March 1 next, less income-tax.

Scarborough.

The statement of accounts and balance-sheet of the Scarborough Gas Company for the year ended Dec. 31, 1934, states that the price of gas during the whole year has been less than the basic rate of 9·2d. per therm, therefore, in accordance with the Scarborough Gas (Consolidation) Act, 1927, the Directors recommend that the dividend for the year on the ordinary stocks be increased from 5% to 6%, which will account for £2,362, that £131 be carried to the reserve fund account, and that the total of these two amounts, £2,493, be placed to the profit-sharing scheme; this amount being one-sixth of £14,958, which was the "consumers' benefit" for the year. The balance standing at credit of net revenue, after taking into account interest charges, interim dividend, &c., is £14,438, and, after providing for final dividend, &c., there remains £1,702 to carry forward. The interim dividends of 2½% on the preference and ordinary stocks were paid on Aug. 10 last, and the final dividends of 2½% on the preference stocks and 3½% on the ordinary stocks will be payable on Feb. 22. Despite the abnormally mild weather during the latter part of the year, which had an adverse effect on the output, the sale of gas in 1934 showed an increase of 9,801,400 c.ft. (44,107 therms), equal to 1·5%; the quantity sold being 642,530,200 c.ft. (2,891,386 therms).

Shanklin and Ventnor.

The report of the Directors of the Shanklin and Ventnor Gas Company for the year ended Dec. 31, 1934, shows that the balance standing to the credit of the profit and loss account is £12,071 after payment of an interim dividend of 4%, less income-tax. The Directors recommend the declaration of a final dividend of 4% for the half-year, making 8% for the year, less income-tax. The Directors record with great regret the death on Dec. 17 last of their former Manager and Secretary, Mr. Frank C. Taylor. There has been a satisfactory increase in the sales of 4·4% over the year 1933. Additional mains have been laid in Ventnor and others renewed and enlarged. The dividend, if sanctioned, will be payable on March 1.

Sunderland.

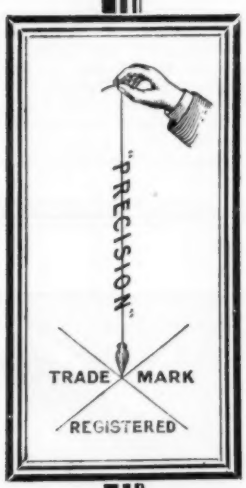
The report of the Directors of the Sunderland Gas Company for the year ended Dec. 31, 1934, states that the sales of gas amounted to 6,344,009 therms during the year. The profit and loss account shows that after deducting interim dividend there is an available balance of £24,234, out of which the Directors recommend the payment of a final dividend of £3%, less income-tax, making £6% for the year, payable on March 9, leaving £15,247 to be carried forward.

Wandsworth.

Notwithstanding the mild weather experienced during the latter part of the year, there has been a satisfactory increase in the sale of gas of 2·28% by the Wandsworth and District Gas Company. The number of consumers is increased by 7,935 and the number of stoves and other appliances by 25,923. A Statutory Order authorizing an increase of capital was obtained in July last. During the year £208,300 4% debenture stock was issued. After providing for debenture and other interest charges, and payment for the half-year ended June 30, 1934, of a dividend of £2 10s.% on the 5% preference stock and £3 10s.% on the consolidated stock, there remains a balance of £103,978, from which the Directors recommend payment of dividends at the same rates, less income-tax, making total dividends for the year of £5% on the preference stock and £7% on the consolidated stock, which permits the allocation of the sum of £26,534 to the Employee Co-Partners.

Weymouth.

Sales of gas by the Weymouth Consumers' Gas Company for the past year again show an increase, the amount sold for the year being 1,270,615 therms. This, compared with the previous year, shows an increase of 71,689 therms, which is equivalent to 5·9%. As from Jan. 1, 1934, the price of gas was reduced from 9½d. to 9d. per therm. The sales of appliances during the year again show the very gratifying increase of 55%. This, together with the sales in the previous year, is equivalent to an increase of nearly 100% in the past two years. The capital of the Company has been increased during the year by the issue of £35,000 4% perpetual debenture stock, which was considerably over-subscribed at a substantial premium. Gas was first supplied to Weymouth in the year 1835, and this year, therefore, marks its centenary. The Directors are considering the best means of commemorating this important event. After providing for the interest on the debenture stocks, the balance at the credit of the net revenue account is £9,192, out of which the Directors recommend the payment of the following dividends: On the ordinary stock at the rate of 6% per annum, less income-tax, less the interim dividend already paid to June 30, 1934; and on the 5½% redeemable preference stock at the rate of 5½% per annum, less income-tax, less the interim dividend already paid.



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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share List, see later page)

Dull conditions prevailed in the majority of markets last week, mainly owing to the uncertainty which exists as to the outcome of several recent events. At home, the trouble in Mincing Lane over the pepper pool, and abroad, the pending decision in regard to the United States gold clause, both led to a curtailment of activity. One bright spot was the home rail market, doubtless attributable to the Southern Railway's successful rating appeal, and prices of most stocks made sharp improvements. Several companies will be issuing dividend statements in a few days' time. Towards the close on Friday rubber shares became active and rose in value in response to an increase in the price of the commodity.

Business in the Gas Market was a trifle heavier than the previous week, and, with the exception of the usual *ex* div. reductions at this time of the year, prices on the whole remained steady. Among the few changes were Newcastle units which advanced 3d. to 26s. 9d. on the local Exchange, and at the time of writing this price includes the full final dividend of £2 17s. 6d.%. Oriental stock gained 2 to 172½, and Wandsworth 4% debenture rose 4 to 110½. Other than the *ex* div. markings, the only fall occurred in South-Eastern Gas Corporation ordinary shares, which dropped 1s. to 30s.

With regard to the recent dividend announcements, it is satisfactory to note that the 1933 rates have been maintained in all cases, while in one instance, that of the Portsmouth Company, the distribution has been increased by ¼% on the half-year. The following is a list of last week's declarations:

	Dividends, 1934.		
	1st Half-Year.	2nd Half-Year.	Full Year.
	%	%	%
Brighton 6%	3	3	7
,, 5%	2½	2½	5
Bristol	2½	2½	5
Chester	2½	3	5½
Newcastle	2½	2⅝	5⅛
Newport (Mon.)	2½	2½	5
Northampton	2½	2½	5
North Middlesex	3⅜	3¾	7⅛
Portsmouth	4	4¼	8¼
Uxbridge	3½	3½	7
Tottenham	3⅜	3⅜	6¾

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *Feb.* 11.

The Tar Products market has continued steady during the past week, and current values are as under:

Pitch, about 45s. per ton f.o.b.

Creosote, 5d. to 5½d.

Refined tar, 4d. per gallon in bulk at makers' works.

Pure toluole, 2s. 2d. to 2s. 3d.; pure benzole, 1s. 9d. to 1s. 10d.; 95/160 solvent naphtha, 1s. 5½d.; and 90/160 pyridine, about 6s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Feb. 11.

The average prices of gas-works products during the week were: Gas-works tar, 20s. 6d. to 25s. 6d. Pitch—East Coast, 41s. 3d. to 43s. 9d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 41s. 3d. to 43s. 9d.* Toluole, naked, North, 1s. 7d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 4¾d. Heavy naphtha, North, 9¾d. to 10¾d. Creosote, *ex* works, in bulk, North, liquid and salty, 4⅜d. to 4½d.; low gravity, 4⅜d. to 4½d.; Scotland, 4⅜d. to 4½d. Heavy oils, in bulk, North, 4d. to 4¼d. Carbolic acid, 60's, 1s. 10d. to 1s. 11d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Feb.* 9.

Trading conditions in this district have been rather quiet during the week, although prices are, on the whole, well maintained.

Crude gas-works tar.—Actual value remains at 29s. to 31s. per ton *ex* works in bulk.

Pitch.—Market is without interest, and quotations are unchanged at 43s. to 44s. per ton f.o.b. Glasgow for export and 42s. 6d. per ton *ex* works in bulk for home trade.

Refined tar.—This is procurable in substantial quantities at 3d. to 3¼d. per gallon f.o.r. naked.

Creosote oil remains scarce, and, although prices are expected to go still higher, average values during the week remain unchanged. B.E.S.A. Specification, 4¼d. to 4⅜d. per gallon; low gravity, 4⅜d. to 5d. per gallon; and neutral oil, 4¼d. to 4⅜d. per gallon; all f.o.r. in bulk.

Cresylic acid.—Makers are holding for the following prices: Pale, 97/99%, 1s. 3d. to 1s. 4d. per gallon; dark, 97/99%, 1s. 1d. to 1s. 2d. per gallon; and pale, 99/100%, 1s. 4d. to 1s. 5d. per gallon; all *ex* works.

Crude naphtha is rather scarce, and value is steady at 4d. to 4½d. per gallon, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 heavy is 9d. to 10d. per gallon.

Motor benzole is called 1s. 3d. to 1s. 4d. per gallon for reasonable quantities, but available supplies are small.

Pyridine.—90/160 grade is 5s. 6d. to 6s. per gallon, and 90/140 grade 6s. to 6s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9	to	0 9½	per gallon at works
Motor ,,	1 3½	,,	1 4	,, ,, ,,
90% ,,	1 4	,,	1 4½	,, ,, ,,
Pure ,,	1 7½	,,	1 8	,, ,, ,,

Contracts Advertised To-Day

Ammonia Plant.
Dewsbury Gas Department. [p. 394.]

Boilers (Wash) and Boiling Rings.
Port Talbot Gas Department. [p. 394.]
Yeovil Gas Department. [p. 395.]

Coal.
Plymouth Corporation. [p. 395.]

Cookers.
Yeovil Gas Department. [p. 395.]

Gasholders.
Chelmsford Gas Department. [p. 395.]
Omagh Gas Department. [p. 395.]

General Stores.
Port Talbot Gas Department. [p. 394.]
Sowerby Bridge Gas Department. [p. 394.]

Lighting Goods (Mantles, Burners, Pendants, Glassware, &c.).
Plymouth Corporation. [p. 395.]
Port Talbot Gas Department. [p. 394.]

Mainlaying.
Omagh Gas Department. [p. 395.]
Teignmouth Gas Department. [p. 394.]

Meters.
Port Talbot Gas Department. [p. 394.]
Yeovil Gas Department. [p. 395.]

Paints.
Sowerby Bridge Gas Department. [p. 394.]

Pipes, &c.
Omagh Gas Department. [p. 395.]
Port Talbot Gas Department. [p. 394.]
Sowerby Bridge Gas Department. [p. 394.]

Retorts, &c.
Dukinfield Gas Department. [p. 395.]
Sowerby Bridge Gas Department. [p. 394.]
Teignmouth Gas Department. [p. 394.]

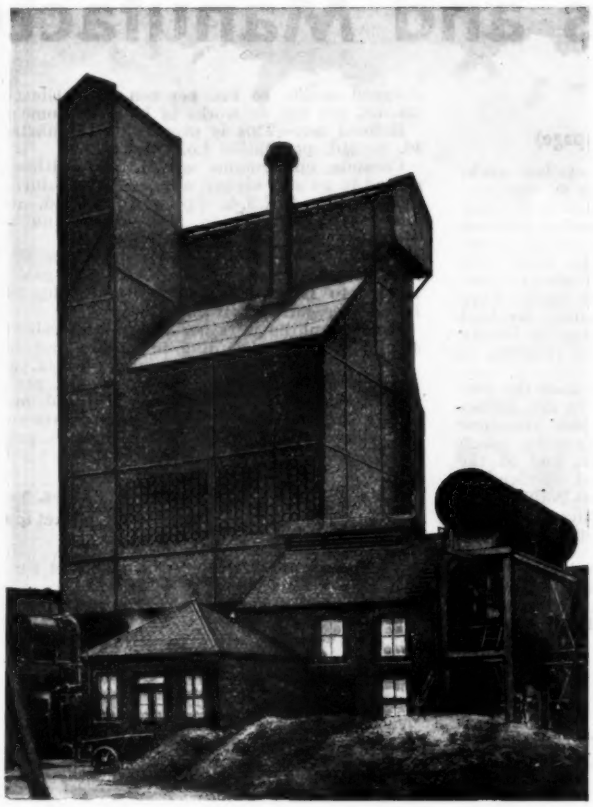
Trade Notes

"MeLeSco" Superheaters.

We have received from the Superheater Company, Ltd., Bush House, Aldwych, W.C. 2, a copy of their new publication dealing with the Company's activities in the public utility, industrial, and marine fields. Particular mention is made of the "MeLeSco" superheaters for water tube boilers, and illustrates and describes many of the important installations designed and constructed by the Company.

Lubricated Plug Valve.

Messrs. Newman, Hender, & Co., Ltd., manufacturers of brass, gunmetal, and iron valves, cocks, and general steam and water fittings, of Woodchester, Gloucestershire, have kindly forwarded us a copy of their catalogue No. 55 M illustrating and describing the Newman-Milliken Patent Lubricated Plug Valve. Many advantages are claimed for this type, among which particular mention is made of the parallel plug, and what is known as "solid head" construction which obviates the necessity for a packing gland.



LEVEN, SCOTLAND

This installation of 12 Glover-West vertical retorts with a nominal total daily capacity of 720,000 cubic feet was built at the works of the Buckhaven and Leven Gas Commissioners in 1926. An order was recently received from the Commissioners for a second installation, on which work is now proceeding. This unit will comprise a further four retorts, bringing up the nominal daily capacity of the plant to 960,000 cubic feet.

Another repeat order for

GLOVER-WEST VERTICAL RETORTS

IN Scotland there are now 27 gasworks equipped with Glover-West vertical retorts. At twelve of these works extensions have been or are being added. The Montrose Gas Company, Ltd., the Falkirk Corporation Gas Department and the Johnstone Corporation Gas Department are amongst the undertakings from whom repeat orders have recently been received.

Considerably more than 510 million cubic feet is the estimated total daily gas output of Glover-West vertical retort plant in the United Kingdom and in 20 countries overseas. The total number of retorts installed exceeds 10,000. Out of more than 230 of the world's gas undertakings now equipped with Glover-West vertical retorts, repeat orders for extensions have been received from no less than 150.

This Company continues to pursue a policy of constant effort towards the further advancement of modern gasworks practice. We are prepared at all times to co-operate with engineers and administrators to the full extent of the resources of our organization, in the common interest of gas progress.

GLOVER-WEST VERTICAL RETORTS . . . WESTVERTICAL CARBONIZING CHAMBERS . . . THE WEST LIP-BUCKET CONVEYOR WITH AUTOMATIC FORCED LUBRICATION . . . BELT AND PUSHPLATE CONVEYORS . . . ELEVATORS . . . COAL BREAKERS . . . COKE CUTTERS . . . WAGON TIPPLERS . . . SKIP HOISTS . . . TELPHER PLANT WASTE-HEAT RECOVERY AND BREEZE-BURNING EQUIPMENT

WEST'S CARBONIZING & FUEL-HANDLING SYSTEMS

WEST'S GAS IMPROVEMENT COMPANY, LTD.

LONDON - REGENT HOUSE, KINGSWAY, W.C.2
'Phone: HOLBORN 4108. 'Grams: "IMVERTRET, WESTCENT"

MANCHESTER - ALBION IRONWORKS, MILES PLATTING
'Phone: COLLYHURST 2961. 'Grams: "STOKER, MANCHESTER"

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Feb. 8.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Sept. 10	7	7	Alliance & Dublin Ord. ...	135—145	...	142½
874,000	"	Dec. 17	4	4	Do. 4 p.c. Deb. ...	90—100	...	...
557,655	"	Aug. 13	7	7	Barnet Ord. 7 p.c.	168—173	...	173
300,000	1	Oct. 8	1/9‡	1/4‡	Bombay, Ltd.	30/— 32/-	...	31/-
178,480	Stk.	Aug. 13	9½	9½	Bournemouth sliding scale	227—237	...	...
550,050	"	"	7	7	Do. 7 p.c. max. ...	172—177	...	175½
439,160	"	"	6	6	Do. 6 p.c. Pref. ...	150—155	...	154—155
50,000	"	Dec. 17	3	3	Do. 3 p.c. Deb. ...	86—91	...	...
262,025	"	"	4	4	Do. 4 p.c. Deb. ...	107—112	+1	110—110½
335,000	"	"	5	5	Do. 5 p.c. Deb. ...	130—135	...	135
357,900	"	Aug. 13	7½	7½	Brighton, &c., 6 p.c. Con. ...	181—186	...	185—181½
540,000	"	"	6‡	6‡	Do. 5 p.c. Con. ...	160—165	...	164
196,500	"	"	6	6	Do. 6 p.c. B. Pref.	145—150	...	149
1,487,500	"	Feb. 4	5	5	Bristol 5 p.c. max.	120—122a*	−2	...
130,420	"	Dec. 17	4	4	Do. 1st 4 p.c. Deb. ...	102—104a	...	...
217,870	"	"	4	4	Do. 2nd 4 p.c. Deb. ...	102—104a	...	...
328,790	"	"	5	5	Do. 5 p.c. Deb.	122—124a	...	...
885,000	"	Sept. 24	8	7	British Ord.	174—179	...	176
100,000	"	Dec. 17	7	7	Do. 7 p.c. Pref.	160—165	...	165
190,000	"	"	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
450,000	"	"	5	5	Do. 5 p.c. Red. Deb. ...	111—116	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	Dec. 17	4½	4½	Do. 4½ p.c. Deb. ...	90—95	...	90
636,860	"	Jan. 21	6	6	Cardiff Con. Ord.	133—138	...	...
237,860	"	Dec 17	5	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	"	Feb. 4	5	5½	Chester 5 p.c. Ord.	111—116b*	−2	...
98,986	1	Sept. 24	2/-	2/-	Colombo, Ltd. Ord.	1⅞—1¾	...	...
24,500	1	"	1/4½	1/4½	Do. 7 p.c. Pref. ...	19/6 - 21/6	...	...
609,204	1	Sept. 24	/11'48	/11'48	Colonial Gas Assn, Ltd. Ord.	19/6—21/6	...	...
296,058	1	..	1/8'30	1/8'30	Do. 8 p.c. Pref.	26/— 27/-	...	...
1,775,005	Stk.	Feb. 4	6	6	Commercial Ord.	120—125*	−2	124—125
475,000	"	Dec. 3	8	8	Do. 8 p.c. Deb. ...	88—92	...	...
286,344	"	Aug. 13	5	5	Do. 5 p.c. Deb. ...	125—130	...	127—127½
807,560	"	Aug. 13	7	7	Croydon sliding scale ...	167—172	...	169—170½
669,590	"	"	5	5	Do. max. div.	116—121	...	119
620,385	"	Dec. 17	5	5	Do. 5 p.c. Deb.... ...	130—135	...	...
542,270	"	Aug. 13	10	7	Derby Con.	200—210a	...	...
55,000	"	Dec. 17	4	4	Do. 4 p.c. Deb.	100—105a	...	...
239,000	"	Feb. 4	5	5	East Hull Ord. 5 p.c. ...	111—116*	−2	...
181,625	"	Feb. 4	6	6	East Surrey Ord. 5 p.c. ...	138—143*	−2	142
175,609	"	Dec. 17	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
1,002,180	"	Sept. 10	17	18	European, Ltd.	120—125	...	...
19,813,481	"	Feb. 4	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	27/9 - 28/9/*	−/3	28/—28/4½
2,600,000	"	"	8½	8½	Do. 8½ p.c. max. ...	93 - 97*	−1	96½—97
4,477,106	"	"	4	4	Do. 4 p.c. Con. Pref. ...	109- 112*	−1	110—111½
6,102,497	"	Dec. 3	8	8	Do. 8 p.c. Con. Deb. ...	92- 96	...	93½—93⅞
3,643,770	"	"	5	5	Do. 5 p.c. Red. Deb. ...	119- 122	...	120—121
3,500,000	"	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	117—120	...	119½—120½
270,466	"	Aug. 13	6	6	Harrogate New Cons. ...	140—145	...	...
140,000	1	Sept 24	1/7½	1/7½	Hongkong & China, Ltd. ...	18—18	...	...
313,200	Stk.	Aug 13	6	6	Hornsey Con. 3½ p.c. ...	137—142	...	...
5,600,000	"	Oct. 22	14	10	Imperial Continental Cap.	217—222	...	218½—221
338,130	"	Jan. 21	3½	3½	Do. 3½ p.c. Red. Deb.	91—96*	...	...
235,242	"	Aug. 13	8½	8½	Lea Bridge 5 p.c. Ord. ...	190—200	...	...
9,167,410	"	Aug. 13	6	6	Liverpool 5 p.c. Ord. ...	145—147b	...	...
345,500	"	Dec. 17	5	5	Do 5 p.c. Red. Pref. ...	105—110b	...	...
306,088	"	Jan. 16	4	4	Do. 4 p.c. Deb. ...	104—107b	...	...
11,751	"	Aug. 27	10	8	Maidstone 5 p.c. Cap. ..	188—198	...	...
63,480	"	Dec. 17	3	3	Do. 3 p.c. Deb. ...	83—88	...	...
75,000	"	Dec. 3	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne)	205—215	...	...
393,000	—	Oct. 1	5½	5½	5½ p.c. Red. Deb.	102- 107	...	104½—105½
231,278	Stk.	Feb. 4	5	5	M. S. Utility "C." Cons. ...	118—118*	−2	...
818,657	"	..	4	4	Do. 4 p.c. Cons. Pref.	100—105*	−1	104½—101½
360,075	"	Dec. 17	4	4	Do. 4 p.c. Deb. ...	102—107	...	...
148,955	"	"	5	†5	Do. 5 p.c. Deb. ...	127—132	...	...
125,000	—	Jan. 2	11/8	3½	Do 3½ p.c. Rd. Rg.Bds.	98—101	...	...
675,000	"	May '8	†6	†13	Montevideo, Ltd.	55—65	...	...
2,061,315	"	Aug. 13	5½	5	Newcastle & Gateshead Con.	26/6—27/6d/	+/3	...
682,856	"	"	4	4	Do. 4 p.c. Pref. ...	107—109d	+½	...
776,706	"	Dec. 17	3½	3½	Do. 3½ p.c. Deb. ...	100—102d	...	...
277,285	"	Oct. 8	5	5	Do. 5 p.c. Deb. '43 ...	105—107d	...	...
274,000	"	Feb. 4	5	5	Newport (Mon.) 5 p.c. max.	108—110a*	−2	...
204,940	"	Aug. 13	7½	7½	North Middlesex 6 p.c. Con.	172—177	...	...
396,160	"	Feb. 4	5	5	Northampton 5 p.c. max. ...	105—110*	−2	...
300,000	"	Nov. 5	†7	†9	Oriental, Ltd.	170—175	+2	171½—173½
416,617	"	Dec. 17	8	8	Plym'th & Stonehouse 5 p.c.	182—187	..	185
504,416	"	Feb. 4	8	8	Portsm'th Con. Stk. 4 p.c. Std	182—187*	−3	...
241,446	"	"	5	5	Do. 5 p.c. max. ...	110—115*	−2	...
114,000	..	Jan. 21	5	5	Preston 5 p.c. Pref. ...	108—113	...	...
1,736,968	Stk.	Aug. 27	6	6	Sheffield Cons.	147—149e	...	...
95,000	"	Jan. 7	4	4	Do. 4 p.c. Deb.	100—104e	...	...
133,201	"	Aug. 13	5	5	Shrewsbury 5 p.c. Ord. ...	155—160	...	...
90,000	10	May 28	†4	†3	South African	3—4	...	...
927,177	1	Sep. 10	1/22	1/22	South-East'n Gas Cn. Ld Ord	29/—31/-	−1/-	29/-
786,061	1	..	-/10‡	-/10‡	Do. 4‡ p.c. Red. Cum. Pref	22/6—23/6	...	22/6—23/3
450,000	Stk.	Feb. 4	74/4	4	Do. 4 p.c. Red. Deb. ...	100- 103*	−2	...
6,709,895	"	Feb. 4	5	6½	South Met. Ord.	137—142*	...	137—140½
1,135,812	"	"	6	6	Do. 6 p.c. Irred. Pf.	150 - 155*	−1	152—154½
850,000	"	"	4	4	Do. 4 p.c. Irred. Pf.	106—109*	−1	107⅞
1,895,445	"	Dec. 17	3	3	Do. 3 p.c. Deb. ...	91—94	...	93½—94
1 000,000	"	Jan. 7	5	5	Do. 5 p.c. Red. Deb.	118—121	...	120
209,320	"	Aug. 13	8½	8½	South Shields Con.	186—188d	...	...
1,548,795	"	July 9	6	6	South Suburban Ord. 5 p.c.	145—150	...	146½—149
512,825	"	"	5	5	Do. 5 p.c. Pref.	124—129	...	126—127½
500,000	"	"	4	4	Do. 4 p.c. Pref.	105—110	...	...
868,887	"	Dec. 17	5	5	Do. 5 p.c. Deb.	129—134	...	135
250,000	"	"	4	4	Do. 4 p.c. Deb.	107—112	...	...
647,740	"	Feb. 4	5	5	Southampt'n Ord. 5 p.c. max.	116—121*	−2	...
121,275	"	Dec. 17	4	4	Do. 4 p.c. Deb.	102—107	...	...
350,000	"	Feb. 4	5½	5½	Swansea 5½ p.c. Red. Pref.	113—118*	−1	117½
200,000	"	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb.	100—105	...	...
1,076,490	"	Aug. 13	6‡	6‡	Tottenham and District Ord.	165—170	...	167½—168½
409,835	"	"	5½	5½	Do. 5½ p.c. Pref. ...	133—138	...	...
62,285	"	"	5	5	Do. 5 p.c. Pref. ...	122—127	...	...
199,006	"	Dec. 3	4	4	Do. 4 p.c. Deb. ...	102—107	...	106
369,774	"	Feb. 4	7	7	Uxbridge, &c., 5 p.c. ...	166—171*	−2	...
108,330	"	..	5	5	Do. 5 p.c. Pref. ...	122—127*	−2	...
1,826,700	"	Feb. 4	7	7	Wandsworth Consolidated	167—172*	−1	168½—172½
1,371,373	"	..	5	5	Do. 5 p.c. Pref.	125—130*	−2	127½
1,317,964	"	Dec. 17	5	5	Do. 5 p.c. Deb.	132—137	+2	134—135
208,300	"	"	26/8	4	Do. 4 p.c. Deb.	108—113	+4	...
158,400	"	Aug. 13	6g	5	Winchester W. & G. 5 p.c. Con.	120—125	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g.*—Paid £8, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

COMPANY NOTICES.

SOUTHGATE AND DISTRICT GAS COMPANY.

NOTICE OF GENERAL MEETING.

NOTICE is Hereby Given that the ANNUAL GENERAL MEETING OF THE COMPANY will be held at the COMPANY'S OFFICES, No. 5, GREAT WINCHESTER STREET, OLD BROAD STREET, in the CITY of LONDON, on MONDAY, 4th day of March, 1935, at 12 o'clock noon, precisely, to receive the Report of the Directors and the Accounts of the Company for the Year ended 31st December, 1934; to declare Dividends; to elect a Director; to elect an Auditor; and for other purposes.

The Transfer Books of the Company will be closed from 19th February, to 4th March, 1935, both days inclusive.

By Order,
HYDE C. BURTON,
Secretary.

Secretary's Office,
5, Great Winchester Street,
Old Broad Street, London, E.C. 2.
12th February, 1935.

SOUTHGATE AND DISTRICT GAS COMPANY.

NOTICE OF AN EXTRAORDINARY GENERAL MEETING.

NOTICE is Hereby Given that an Extraordinary General Meeting of the Company will be held at the Company's Offices, 5, Great Winchester Street, Old Broad Street, London, E.C. 2, on Monday, 4th March, 1935, immediately following the Ordinary General Meeting convened for twelve o'clock noon on the same day, at which resolutions will be submitted to the Proprietors present in person or by proxy for their approval for the following purposes:—

1. To approve and confirm the issue of £15,000 Consolidated (Seven per cent. maximum) Stock authorised by the Southgate and District Gas Acts and Orders 1866 to 1927, and made by the Directors on 23rd April, 1934.
2. To empower the Directors to raise from time to time the unissued balance of the additional Capital authorised by the Southgate and District Gas Order 1927, either as Consolidated Stock or as Redeemable or Irredeemable Preference Stock, and to exercise the borrowing powers conferred upon the Company by the Southgate and District Gas Acts and Orders 1866 to 1927 and the Gas Undertakings Acts 1920 to 1934, at such times and upon such terms and conditions as they in their discretion shall determine to be requisite for the purposes of the Company.

By Order,
HYDE C. BURTON,
Secretary.

Secretary's Office,
5, Great Winchester Street,
Old Broad Street, London, E.C. 2,
12th February, 1935.

BRIGHTON HOVE AND WORTHING GAS COMPANY.

NOTICE OF GENERAL MEETING.

NOTICE is Hereby Given that the ANNUAL ORDINARY GENERAL MEETING of the Company will be held at the COMPANY'S OFFICES, No. 5, GREAT WINCHESTER STREET, OLD BROAD STREET, in the CITY of LONDON, on FRIDAY, 1st March, 1935, at 2.30 o'clock p.m. precisely, to receive the Report of the Directors and the Accounts of the Company for the Year ended 31st December, 1934; to declare Dividends; to elect a Director; to elect an Auditor; to appoint a Special Auditor; to empower the Directors to raise from time to time the additional Capital authorized by the Brighton Hove and Worthing Gas Order, 1931, and the Brighton Gas Order, 1934, and to exercise the Statutory Borrowing powers of the Company in respect thereof; and for other purposes.

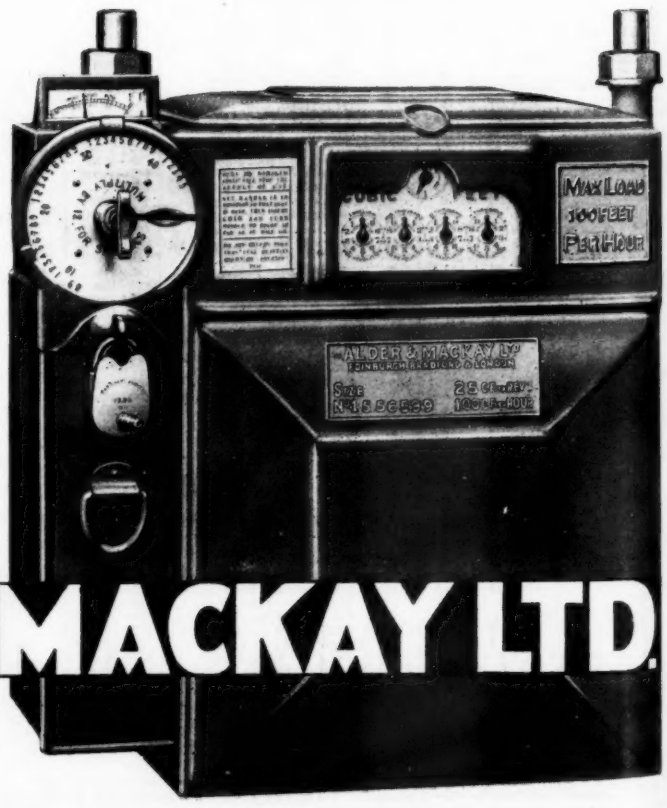
The Transfer Books of the Company will be closed from 16th February to 1st March, 1935, both days inclusive.

By Order,
HYDE C. BURTON,
Secretary.

Secretary's Office,
5, Great Winchester Street,
Old Broad Street, London, E.C. 2.
12th February, 1935.

For further Company Notices see p. 393

DISTANCE DESTROYING FEET! 400 MILES—2,112,000 FEET! IT'S A LONG HIKE, BUT NOTHING IN THE LIFE OF AN A & M METER —FOR WHEN IT COMES TO THE MEASUREMENT OF CUBIC FEET OF GAS—A & M METERS ENDURE!



ALDER & MACKAY LTD.

EDINBURGH, LONDON,
BRADFORD & BRANCHES